TELEPHONE ENGINEER

Vol. I CHICAGO, FEBRUARY, 1909 No. 2

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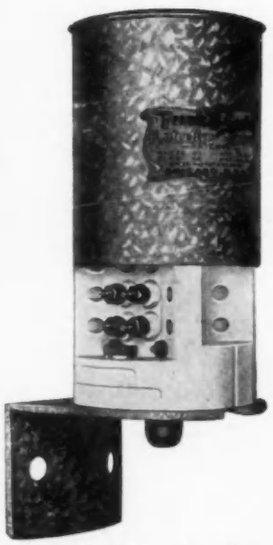

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TELEPHONE ENGINEER

VOL. I — CHICAGO, FEBRUARY, 1909 — NO. 2

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THE INFANT'S RECEPTION.

AFTER the beautiful 3-cent stamps had been affixed to five thousand addressed wrappers of January TELEPHONE ENGINEER and the edition had been mailed to principal telephone exchanges of the United States and Canada, we began to assume a new interest in the work we had undertaken. Our investment had been considerable. The whole scheme was something brand new and essentially different than had previously been undertaken.

We will not gush about what happened. We had anticipated a lot of "ice" and we received much less than we expected. Some of the letters that came pouring in were "warm" and others were surprisingly cordial. We unearthed a great number of new friends among independent and Bell operators. The letters encourage our best efforts. We have had confidential inquiries; heart-breaking confessions; and many appeals for more light on a subject full of intricate problems. The financial, rather than the technical side of the business is most frequently in evidence. We had not hoped for so much sane stuff.

It had long been our belief that there must be some considerable number of men who were coping with the sensible side of the business—men who have their whole fortunes at stake and who are earnestly striving to render the best possible telephone service to their patrons at a satisfactory profit to themselves, and it was these men we were anxious to reach.

TELEPHONE ENGINEER desires the patronage of all telephone men, but especially do we want to help this best class of operators. Our success rests with the thousands who depend upon the far-seeing management of the worth-while systems.

A big operator in one of the central states, who denies us the privilege to use his name, says:

> I have your sample copy of TELEPHONE ENGINEER. In your second editorial you say: "The life of any business depends upon competition." This, in connection with the telephone business in which my entire interest and energy is enlisted for life, is bordering on the impossible. From my point of view it means that all competition thus far attempted is speedily developing into a "kill or be killed" affair.
>
> You say: "The ramifications of the telephone should extend to the remotest corners of the earth, because its functions are limitless." Am I to understand you assume that every person who has a telephone of one system will have the telephones of two or more systems? If not, what percentage and class of people do you expect will have the telephones of less than two or the competing systems? And if any considerable portion of the people made up of any particular class is to be served by less than two or more competing systems, how do you expect the equilibrium of the competitors to remain sufficiently stable to prevent one from gaining sufficient advantage to kill the other?
>
> I assume that as an operator of considerable importance, I cannot afford to be without everything that is being said in print concerning these vital problems.

We want to point out, first of all, that the telephone business has been seriously affected by a real and still prevailing panic. There has been a tremendous amount of matter which has said that the telephone is such a useful thing that the panic has not feazed it, but that is hardly true. A healthy business should show constant expansion. Telephone systems, judged by the manufacturing and other conditions, have not been forging ahead of late. Where the capitalization reflects real investment, the subscriber list has held strong and it has been possible in such cases to meet the overhead operating expenses, make only the urgent and necessary repairs and pay the regular dividends. But there has been very small expansive development and practically no attempt at a campaign for new business among a class who already know the benefits to be derived from the telephone and are too cramped to indulge the luxury, and that other much larger class who have not been educated to the advantages of the instrument. Prosperous times will bring thousands of new subscribers from each of these classes, who now find use for the things which are to them of greater requirement.

It is certainly not essential that everybody having use for a telephone must provide themselves with more than one instrument. The tangental relation of the telephone plant to the largest number of subscribers is inconsequential when compared to the radial influence of the competing systems, contemplating two as the maximum. The latter condition provides the flexibility which imposes trifling hardship upon the subscriber who finds either system fulfilling most of his needs. By the use of either system he can buy his household provisions, call the police, reach the fire department, send his telegrams and summon the expressman, and all of these in turn can reach him. It has been determined that eighty-five per cent of the present subscriber field look to outgoing calls as of infinitely greater value than the incoming calls. Actual count has found that duplication affects as few as seven per cent of the whole. This percentage will always be susceptible to greater reduction where competition exists. Without competition the percentage would have no such tendency.

And upon the presumption that the contest is real, the service rendered by each competitor and the price at which the service is to be had will preclude the possibility of an ultimate single system. After all, it is the price and the service which gets and holds the business. Good service is dependent, too, upon the price, and the sensibly organized plant can always render good service at a fair price, by which is meant a price that provides a profit to the operator. In any community, take the example of the two prospective subscribers—the residence and the business district—the eighty-five per cent plus and the fifteen per cent minus classes, and assure the residential patron a better service, at a lower cost (made possible because of judicious buying of highly efficient apparatus which has been properly installed) and he will sign a contract. He will not buy on sentiment. You guarantee to render him good service and save him money and you get his order. The business concern with its greater requirement of increased connections which competition develops, is forced to the adoption of a second system, because it can not afford to lose the old customer who has found a sensible economy. The struggle for supremacy by two companies can not develop a "kill or be killed" climax. The business will increase or decrease in proportion to the efforts made by the contending factions. Natural growth in population; development of new subscribers from the class which finally concludes it can afford a luxury and the further development among the always present non-educated class will provide an open field for the fittest. Life insurance is an old institution—everybody is a prospect, but there are still remaining a few who haven't taken out policies.

OVER-EXERTING THE TRUTH.

THE annual report of the secretary of the International Independent Telephone Association has been read and approved by the members of the Independent Telephone Manufacturers' Association. At any rate, there having been no protest from the manufacturers' association, it is reasonably safe to assume that the International secretary's report has been accepted and ordered placed on file.

The sang-froid of the manufacturer is great. He puts up the money for the International association, or most of it; he expects something for his money and gets it; so it would be very unkind of him to offer any resentment. He has been doing this sort of thing since 1897—this putting up of money each year, and repeat, until a nice long report per annum carries with it the charm of a conscience at ease with all the world.

But to go back over subsequent reports of the International secretary, it is interesting to note the gradual change toward the newer order of things. There is a little less "blood and thunder" from year to year. There is seldom a promise and rarely a look to the future. Telephone Engineer can quote with considerable pride this tiny excerpt: "* * competition or the possibilities of competition is inevitable in the telephone business, and for the best interests of the public." Naturally, we would like to know whether the right is reserved for the independents to compete with themselves, or whether others will be regarded as eligible, but the matter is clouded.

It may be unkind of us to offer criticism without first submitting the proposition to the executive committee of the International association, but we cannot spare the time to do that. There are only eight inches of concrete and steel separating Telephone Engineer's offices from the International association headquarters, but time has become indispensible in the conduct of a paper that dares a few things without asking odds. We take it, however, that when the secretary of the International association is preparing his annual report for the manufacturers' association, he is quite busy himself, for he has used some very misleading figures to emphasize his strongest remarks. He very thoughtlessly, and without giving proper credit, referred to "A book published, June, 1908," which contained the "names and capitalization of 12,045 non-Bell or independent telephone companies." Most telephone people know that the book referred to is Telephony's telephone directory of this and several other countries—the largest and completest index; the most and finest and best, etc., compilation ever heralded before a prosperous industry in modern times. And with all that circus caption it is a splendid effort, taken by and large, for it has cost a lot of money to get the information, good and bad, between covers. But we're digressing from those 12,045 non-Bell, independent companies.

In a purely idle moment, we enlisted part of our office force and retired to the presence of one of these directories—which are always leased to advertisers, except in cases like the association's secretary—and there we counted and kept tab. We went about it with painstaking

care. We were curious about those 12,045 listings. Down one column after another and from page to page we had a look. One third of 12,045 is 4,015. It took a day, a hard day at that, to cover the book from Alexander, Alabama, to Red Oak, Iowa, but we stopped there because in most cases a third is enough to judge the remaining two-thirds by, and Red Oak isn't a bad town to stop at anyway, if you can find Uncle Billy Butterfield's residence on the hill!

And this is what we were looking for—always with reverence for the things we skipped.

Out of 4,015 names, 1,132 gave no detailed information whatever, beyond the population of the town—contributed by the last census report, and the kind and number of instruments—contributed by just an ordinary guesser.

If you will look at this book from the same angle, you will probably conclude with us that an address which has stood more than seven years, and which has frequently and courteously been requested to give out certain information without doing it, is not above suspicion. But let us be charitable and conclude upon this basis that there are not less than 1,500 operating Bell companies listed among the simon pure.

We also found among these same 4,015 names 1,129 companies which acknowledge twenty-five or less instruments installed. This ratio carried out would list nearly 3,500 companies of this small class. Many of them claim as few as eight instruments. Hundreds appear as having more than twenty-five and less than fifty instruments—all small systems, of which we took no account and which are far out of reach of the strong arm of the association's secretary, because behind each station is a quarter or a full section of land.

It should not be forgotten that other hundreds of systems fail to give instrument installation, while careful to give other data. There are some wonderful statements: In Arkansas, a company gives a capitalization of $350,000 and four instruments installed. In Nebraska a company in a small town has 10,000 stations with a total capitalization of the same number of dollars.

But the vital point, the reason for this screed, is the danger to misjudge the strength of the independents reckoned on a basis of 12,045 operating companies—all non-Bell. There arn't nearly so many. Large numbers of concerns are listed which exist only on paper.

Upon the officers of the International Independent Telephone Association must surely fall the requisite of being thoroughly prepared. It should not be sufficient for an officer to make a statement of retaliation based upon figures so flagrantly unstable as the ones that have been used.

A TRIUMPH OF THE WIRELESS.

HOWEVER simply they may be explained, the phenomena of wireless transmission must ever affect the layman with all the power of attractive mystery. Even the practical worker in wireless fields, the constant student of electrical wave manifestations, is keenly alive to the romance side of his science.

These two classes of observers were afforded a spectacular example of both the useful and the picturesque side of the wireless in the recent disaster to the steamship "Republic," which was rammed by the "Florida" in a heavy fog January 23. Immediately after the accident the wireless apparatus on the steamer flashed the news of her plight in all directions. Within a short time several vessels, including the liner "Baltic" and two revenue cutters, were on their way to the disabled ship. The value of the wireless was never better shown.

One of the big metropolitan dailies had the following to say of what it calls a "marvelous feat of the wireless":

"An achievement of wireless telegraphy that filled the civilized world with awe took place today when the big White Star liner Republic was disabled off Nantucket, Mass. The captain of the great vessel found his ship and his passengers in deadly peril. The engine room was full of water. No craft was in sight. Land was twenty-six miles away. Wireless telegraphy, the once-doubted invention of the wizard Marconi, was the captain's only hope. He rushed to the operator. Frantically the man at the instrument sent up into the air the signal for help. He had no guidance but the hope that somewhere in the mysterious sky above him the desperate appeal would be caught by air waves and wafted to another ship, or to some wireless magician on land. The hope was not in vain. The message reached two other big liners and two revenue cutters.

"'In distress and sinking,' it said, and gave the name of the ship, and the latitude and longitude.

"All on board the Republic were saved!"

TWO TELEPHONE SYSTEMS.

THE *Philadelphia Telephone News* says: "The incoming telephone business of the stores is very heavy. It has been estimated that over 60 per cent of the incoming messages are orders for goods. These orders are now going to the stores which are fully equipped for handling such business." This sentiment is directly in accordance with the article entitled "Co-operation versus Competition" printed elsewhere in this issue of TELEPHONE ENGINEER.

OPERATOR'S UNIQUE EMERGENCY MEASURE.

A FIRE at Rising Star, Texas, burned out the telephone exchange. In order to get communication out of the city the telephone operator, a young lady, rigged up a temporary office on a telephone pole, and, perched on a ladder, conveyed the news of the fire to the press. This action shows that kind of spirit which makes of any business a success, and is a hint to those male employes of telephone companies who wait until the ashes are cold after a fire to restore communication.

Electrical supply houses and contractors of Omaha, Neb., and Council Bluffs are arranging to give an electrical show May 6-15 inclusive. G. W. Johnston is the president of the organization; A. G. Munro, vice-president; W. L. Burgess, secretary; J. R. Lehmer, treasurer, and J. M. Gillan, manager. The show will be given at the Auditorium.

The date of meeting of the Electrical Committee of the Underwriters' National Electric Association has been fixed for Wednesday and Thursday, March 24 and 25, at the rooms of the New York Board of Fire Underwriters, 32 Nassau street, New York City, at 10 o'clock on Wednesday morning.

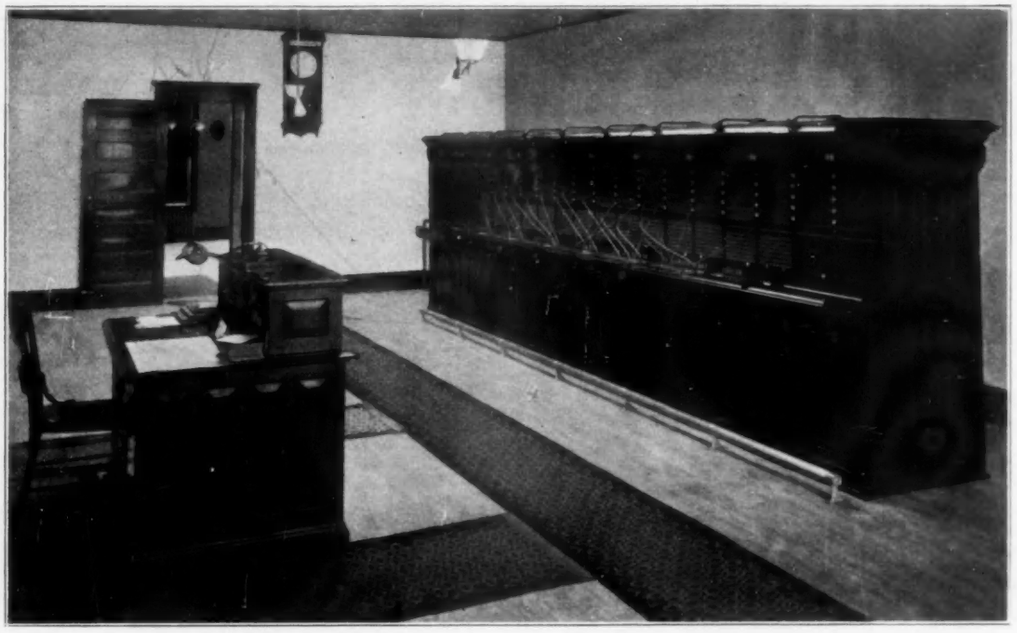
Telephones have been placed on the arms of the chairs in some of the New York barber shops.

Two Model Central Energy Exchanges

By Gifford Wheeling

A MULTIPLE jack capacity of 3,000 may be said to be a fairly representative size for common battery telephone switchboard installations. Such an installation will serve efficiently a community of about 15,000, and is large enough to require those auxiliary parts which go to make up a complete exchange equipment. The detailed requirements of such an exchange are well illustrated by a study of the system recently perfected at Appleton, Wis.

In January, 1902, the Fox River Valley Telephone Company began giving service to Appleton in competition with the Bell system already existing. A switchboard was installed with a capacity of 2,500 lines, equipped for the immediate service of 740 subscribers, the central energy system being used. This installation grew and prospered until in the fall of 1905 its patrons numbered fully 1,100. A complete modern system had been developed, with full underground cable distribution in the business district and approved cable construction in the more remote parts of the city, distribution being affected through pole cable terminals.



The Operating Room, Fox River Valley Company, Appleton, Wisconsin.

In the meantime the independent interests of Green Bay, through Messrs. Jones and Winter, the Chicago engineers who had built their telephone system, opened negotiations with J. S. Van Northwick and associates of the Fox River Valley Company for the consolidation of the two systems. This was achieved in September, 1905. The Valley Telephone & Telegraph Company, of Green Bay, and the Fox River Valley Telephone Company, of Appleton, were combined under the name of Fox River Valley Telephone & Telegraph Company; a complete reorganization was effected and the capital stock of the new company was increased to $350,000. The combined properties constituted one of the strongest single independent systems in the state of Wisconsin.

The new equipment recently installed at Appleton consists of three sections of six-panel, three-position multiple type switchbooard, each section having an ultimate capacity of 3,000 multiple jacks, 240 outgoing trunk multiple and 480 answering jacks and lamps. The present installation is 1,100 subscribers' common battery lines. The cord circuits in each local operator's position are standard double lamp supervision with individual four-party line ringing and listening keys. The operators' telephone sets are equipped with breastplate transmitters. Ten incoming toll trunk circuits are installed between the local switchboard and the toll board. This exchange equipment replaces a smaller multiple type switchboard.

The toll board used with the former switchboard was required to operate in connection with the new switchboard. The present equipment of this toll board consists of 20 toll lines, 10 per position; 10 recording toll trunk circuits multiplied in each section of the local switchboard also terminate at the toll board, and the 10 incoming toll trunk circuits appear here in jacks. Each position of the toll board is provided with a master four-party line ringing key for calling local subscribers.

A one-position chief operator's desk is installed. This desk is equipped with the necessary listening in taps, lines to local switchboard, toll board and wire chief's desk for supervising the service.

There is a one-position wire chief's desk. This desk is equipped with lines and testing trunks to local switchboard, also lines to chief operator's desk and toll board and a testing trunk to main distributing frame. A testing cord circuit is provided with a standard Weston portable volt meter for making all of the necessary tests in an exchange of this type.

The main distributing frame has a present framework for 1,820 lines. This frame is equipped on the arrester side with arresters for 1,100 subscribers' common battery lines and 10 toll lines.

There is also an intermediate distributing frame having a present framework for 1,260 lines installed, and a

The Operating Room, Home Telephone Company, Goshen, Indiana.

relay rack having a present framework for 1,680 subscribers' common battery lines.

The power equipment installed in this exchange consists of two sets of eleven cells of storage battery, two 4-frequency pole changers, one marble power switchboard and one motor generator charging set.

So far as capacity and equipment go, Appleton, Wis., and Goshen, Ind., are almost twin installations. The population of Goshen is only about 9,000, as against possibly 16,000 for Appleton; but the establishment of competitive service in the Indiana city antedated that of Appleton by several years.

There was a Bell exchange in Goshen in 1890. Its rates were high, but were not considered exorbitant because they were recognized as just compensation for patent rights held by the Bell interests.

However, the early demand for competition created the Cushman Telephone Company, which gave very good service at slightly lower rates until it was unseated by disastrous patent litigation. There was then a period of no competition in the Indiana town for some years. But public demand for a choice of systems finally prevailed, and in April, 1897, Messrs. Teters and Hostetter, of Goshen, commenced work on a new independent plant. By October they had constructed what was probably the best independent outside plant in the state of Indiana. But meanwhile the manufacturing company with which they had contracted for switchboard and instruments had failed; and it was December before the plant could be completed.

The new system commenced service with less than 50 subscribers. Two years later, however, the whole property was sold to the newly organized Goshen Telephone Company; and in 1900 this corporation was merged with others in the formation of the Home Telephone Company, the local exchange having expanded until it accommodated nearly 350 subscribers, the switchboard being of the express order-wire transfer system.

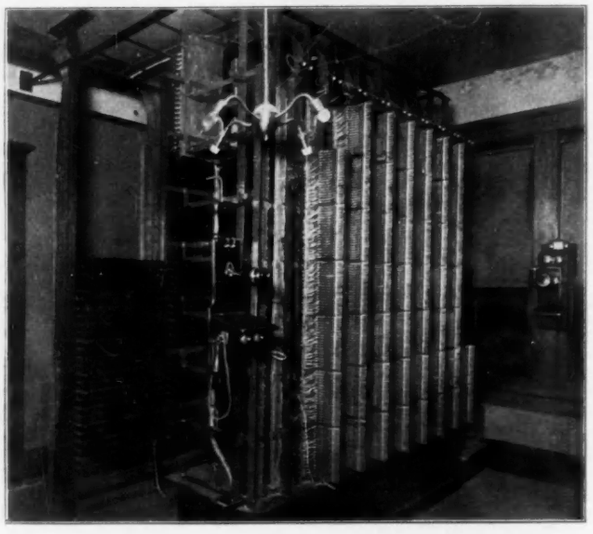
The next few years witnessed a rapid development of the Goshen independent exchange. By 1905 the Home Company had 1,000 subscribers, counting its rural lines, and had entirely outgrown its transfer board. In that year the plant was completely rebuilt, and a new switchboard of the visual target signal type, with lamp super-

Rear View of the Goshen Switchboard.

vision and supposedly large enough to meet any requirements, was installed.

Like many another installation made in that period of intense telephonic activity, however, the new equipment had scarcely begun to show signs of hard use before it, too, became inadequate. The stress of rapid development culminated in the modern installation which now is serving the people of Goshen so efficiently.

The present equipment of the Goshen exchange consists of three sections of six-panel three-position multiple type switchboard, each section having an ultimate capacity of 3,000 multiple jacks, 220 out-going trunk multiple and 480 answering jacks and lamps, 1,100 subscribers' common battery and 40 toll and rural lines are installed. The cord circuits in each local operator's position are of the standard double lamp supervision with four-party line ringing and listening keys. The operator's telephone sets are equipped with breastplate transmitters. Between the switchboard and the toll board are installed 14 two-way toll trunk circuits, terminating in plugs and lamps. There are two of these incoming toll trunk circuits in each equipped local operator's position.



View of Terminal Room, Goshen, Indiana.

There is also one section of two-position desk type toll board. This board is equipped with 40 toll and rural lines, each of these lines being provided with a key for switching the same to the first position of the local switchboard for night toll service. The 14 two-way toll trunk circuits from the local switchboard terminate in this desk in spring jacks and lamps.

A one-position chief operator's desk is used. This desk is equipped with taps from each operator's position, lines to toll board and local switchboard for supervising the service.

A main distributing frame is installed having a present framework for 1,260 lines. The arresters for this frame were furnished by the Home Telephone Company. The relay rack is provided with a present framework for 1,260 subscribers' common battery lines.

The power equipment for this exchange consists of one motor generator charging set, one power switchboard, one set of eleven cells of storage battery and two fur-frequency pole changers.

The Nebraska Independent Convention

At Lincoln, January 13, the Nebraska Independent Telephone Association held its annual convention, with an attendance of over 250. Mayor F. W. Brown was introduced by President C. J. Garland, and gave a short address praising the marked improvement of telephone conditions in Lincoln following the inauguration of competitive service. W. A. Selleck, president of the Lincoln Commercial Club, also addressed the meeting.

President Garlow spoke on methods of improving the association, recommending closer harmony between operating companies, and argued that the interests of the investor should not be lost sight of in an extreme effort to please the public, inasmuch as it is possible to combine both interests. He recommended that the association become incorporated and appoint competent counsel, and urged the adoption of standard accounting systems.

Secretary R. E. Mattison reported an expenditure of almost $2,000,000 in new construction work during the year, and an investment of over $8,500,000 by independent interests of the state. This represents approximately 110,000 telephones and 6,500 miles of toll line.

Some of the papers read at the convention were: "How to Keep Up Telephone Connections," by Wallace Wilson; "Advertising Independent Long-Distance Service," by W. J. Stadelman; "The Work of Our Wire Chiefs," by S. A. Hensley; "The Value of Good Telephone Service," by L. E. Hurtz; "Toll Traffic," by George K. Gann; "Organizing and Financing Telephone Plants," by F. H. Woods; "The Value of Competition," by Charles C. Deering; "Evolution of the Anchor," by M. T. Castor, and "The Necessity of Independent Long-Distance Service to an Independent Company," by C. J. Myers. Other interesting subjects discussed were: "Cable Crystallization" and "Depreciation."

At the banquet a number of interesting addresses were made, some of which were: "The Relation of an Official to the State and Public," by Hon. J. A. Williams; "We Are Growing Some," by F. H. Stow; "The Telephone as a Common Carrier," by Hon. J. A. Williams; "The Funny Side of the Business," by R. V. Montagne; "The Duty of the States in Domestic Corporation," by Hon. H. J. Winnett; "What I Am Going to Do to Monopolies," by Hon. W. H. Cowgill; "Our Emblem," by George D. Ayers, and an impromptu talk on local ownership by A. E. Wilson, attorney for the Automatic Electric Company, Chicago.

The old officers of the association were all re-elected. C. J. Garlow is president; Dr. J. N. Lyman, vice-president, and R. E. Mattison secretary-treasurer.

The day following the convention a conference with the state railway commission was held, at which were present representatives of the independent association, C. E. Yost, president of the Nebraska Telephone Company, and F. A. Pickernell, of the American Telephone and Telegraph Company. The subject of uniform rating was discussed, Mr. Pickernell calling attention to the difficulty of obtaining accurate classified accounts for each exchange and suggesting separate investigation in each individual case, based on a knowledge of business relations with other companies. The independent interests expressed belief in three standard rates—business, residence and farm. Railroad stations were classed as business houses.

How to Read Telephone Circuit Diagrams

By David S. Hulfish

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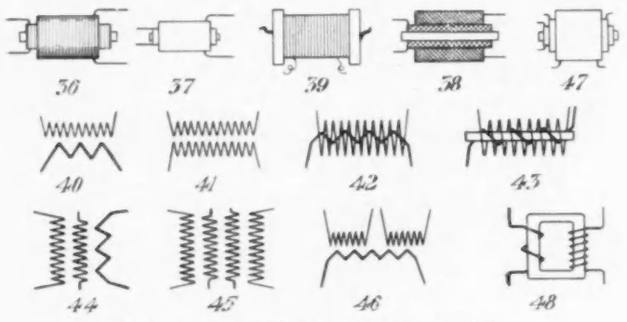
LESSON II.

THE induction coil consists of windings of two separate wires upon the same magnetic core. Uusually, for telephone induction coils for use with transmitters, one of the windings is low compared with the other, being both low in resistance and in number of turns. This winding is next to the core, and is called the primary; the remaining winding is placed upon the first, and is called the secondary. A more efficient coil is made by winding the primary further along the core than the secondary and by making the core to project slightly beyond the primary; hence, we have the symbol of Fig. 36,



Figs. 36 to 48. Diagrammatic Induction Coils.

which represents a side view of such an induction coil, the symbol being shaded with surface shading to show the curvature of the surfaces. The primary and secondary conductors may be identified by noting the identity of the winding which they enter. This symbol is repeated in Fig. 37, but is not found often in diagrams without the shading. A cross sectional view of the induction coil is met frequently, the symbol appearing as shown in Fig. 38.

The symbol (Fig. 39) represents the induction coil in elevation, showing the two square heads usual upon such coils, with the surface of the helix of wire between the heads. The identity of the conductors entering this symbol may be determined by the location of their respective entrances. The conductors entering at the ends or heads apparently pertain to the inner or primary winding, which lies next to the core, and the conductors which enter upon the surface of the helix of wire are manifestly the secondary wires, which form the outer portion of the apparatus.

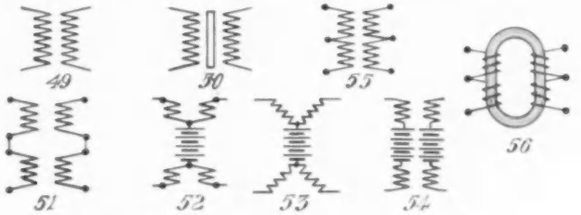
The induction coil is more commonly represented by showing the windings only, as in the symbols of Figs. 40, 41 and 42. In Fig. 40 an induction coil of an unequal number of turns is represented, and in Fig. 41 two windings of equal turns are typified; however, this is a matter in which the indication is not rigidly followed, and Fig. 41 is commonly used without reference to the equality or inequality of the number of turns. The use of the symbol of Fig. 40 is preferable where it properly can be used in a diagram consistently with the facts. In Figs. 40 and 41 the windings are shown separated, but near each other and parallel; this is desirable, since it makes a skeleton circuit more easily read, or, to say the least, makes it look less jumbled and confusing because of the fewer crossed conductors. Fig. 42 shows the true relations of the two windings. Fig. 43 is a more elaborate symbol, and shows the core upon which the conductors are wound.

Induction coils frequently have more than two windings, in which case the additional windings are added to the symbols by amplifying the symbols without changing the principle of their construction. Figs. 44, 46 and 47 show each a primary winding with two secondary windings, or with secondary and "tertiary," as the third winding frequently is called. Fig. 45 shows four windings inductively related, any one of which may be the "primary" so far as the symbol itself goes to show. Fig. 48 typifies the toroidal coil.

In symbols representing induction coils having windings of widely variant turns or resistances, it is customary to show the winding of the lower resistance in a heavier line in the symbol. This is really a graphic representation of the larger diameter of wire used for winding when a lower resistance is desired. Notice the symbols of Figs. 40, 42, 43, 44, and 46, as well as Fig. 39.

To pass from the consideration of induction coils to a study of repeating coils hardly changes the subject, since the repeating coil is only a specific type of induction coil, and the same general symbols apply. A repeating coil is, by its definition, an induction coil having equal windings, so that it merely "repeats" what it receives, passing the telephonic speech currents from one of its windings to the other without changing them in any way.

The simplest symbol for the repeating coil is that of Fig. 49, which is substantially that of Fig. 41. Sometimes the core is found added, as in Fig. 50. A split repeating coil is one which has the middle points of its two windings brought to terminals accessible for the



Figs. 49 to 56. Diagrammatic Repeating Coils.

connection of external conductors. Usually, it is substantially a repeating coil or induction coil of four equal windings. Its symbol is shown in Fig. 51, the connections shown being those which are proper when the coil is to be used merely for repeating from one telephone circuit to another.

The split repeating coil is the type of coil usually used for feeding current supply from a central office battery to a connecting cord pair upon the switchboard, and when so used with one battery, its symbol combined with the battery symbol appears as in Figs. 52 and 53. In Fig. 54, the symbols are combined to represent a split repeating coil associated with two batteries, independent of each other, and each supplying current inde-

pendently to one of the two lines between which the repeating coil is connected.

Fig. 55 shows the usual symbol for a split repeating coil with the central points connected to conductors leading away from the coil. In diagrams of composite telephone and telegraph circuits, and in many trunk circuit diagrams, this connection of the split repeating coil will be found.

A symbol typifying a "closed magnetic circuit" or toroidal repeating coil is shown in Fig 56. The symbol shown is that of a split repeating coil. This type of symbol, which is also essentially the symbol of the induction coil of Fig. 48 may be encountered representing repeating coils or induction coils of any arrangement of windings.

Any induction coil symbol (Figs. 36 to 48) is liable to be found representing a repeating coil in a diagram; nor can such use be considered an abuse of the symbol.

The hook switch of the sub-station telephone set comprises a lever usually horizontal, pivoted at one end, with the free end projecting and having a hook formation to take the telephone receiver. This lever with its hook end forms a part of nearly every symbol representing a hook switch. A spring is provided in connection with the lever for drawing the hook end upward when the receiver is lifted, and the weight of the receiver draws the lever down against the spring when the receiver is hung up. This spring is seldom shown in the symbols. In association with the lever are electrical contacts, some to be opened and some to be closed as the lever rises or lowers.

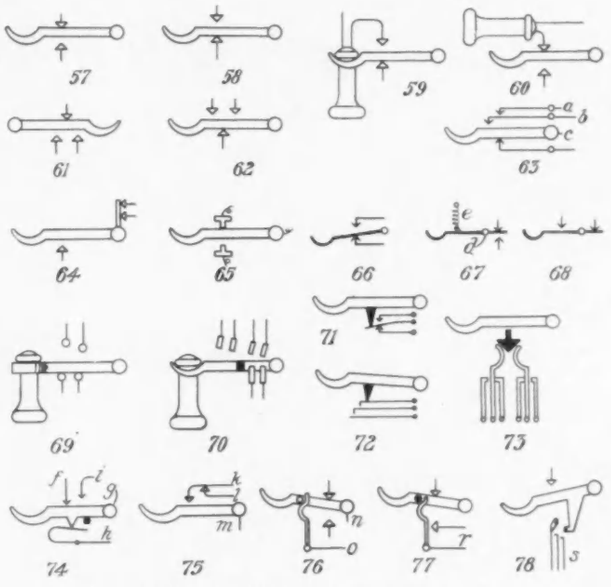
The variation in the number and location of hook switch contacts is beyond recital. They may be grouped into two classes: First, those of hook switches wherein the hook lever itself is one of the electrical members of the switch, or carries one of the switch members rigidly attached to it; second, those of hook switches wherein the electrical switch is a group of switching springs complete in itself, and is merely operated by the hook lever mechanically by reason of the hook lever pushing or pulling upon one of the springs of the group. In skeleton diagrams, the nature of the hook switch seldom is taken into account, but in wiring diagrams it necessarily must be, since it is necessary to identify the terminals of the switch by means of the diagram.

In Figs. 57 to 78 inclusive are shown some symbols for hook switches, and it is hoped that these typical symbols will serve to identify any hook switch symbol which the student may encounter.

Figs. 57 and 58 show the symbol most generally used, and show the switch hook in its two positions. The lever itself is a conductor, and moves between two fixed contact points, one above and one below, with one of which it is in contact electrically when at rest. It will be noted that the "up" or "down" position of the hook lever is to be determined only by the electrical condition of the contacts of the switch; in each instance, the hook lever is horizontal. It is most convenient to draw the lever horizontal when a draftsman is working with a T-square upon a drawing board, hence the prevalence of the horizontal lever.

Another method of showing the position of the hook switch is to show the relative position of the receiver, since with every such switch there is necessarily a receiver. Fig. 59 shows that the hook lever is down by reason of the receiver being hung upon it, and also by the electrical condition of its contacts, the latter being the more reliable index. Fig. 60 shows that the hook lever is up, first by the presence of the receiver in a position other than that of being hung upon the hook, and second by the electrical condition of the contacts, the latter being always the more reliable index. Some draftsmen and other makers of telephone circuit diagrams get into a habit of making the sub-station equipments always of the same type, with the receiver on the book all of the time, or with the receiver off of the hook all of the time, as the case may be, and in such cases recourse must be had to the only true test, viz., the electrical conditions of the contacts.

The contacts may be of any number above or below the hook lever. The hook symbolized in Fig. 61 connects its lever conductor to two others when it is in its depressed condition, and disconnects its lever conductor from them and connects it to one other when in its raised condition. In the hook switch of Fig. 62, the switching is just reversed.



Figs. 57 to 78. Telephone Hook Switch Symbols.

In Fig. 63 the electrical switching condition of Fig. 62 is typified, but a different relation of contact members is shown. In encountering this symbol, it is not likely that any more is intended than that some model which was before the draftsman had its contact springs arranged in this way. However, it is possible that some peculiarity of the circuit of which this symbol is but a part may require that conductor *c* make contact electrically with conductor *b* before either *b* or *c* make contact with conductor *a*, and the symbol of Fig. 63 may have been adopted for that reason.

Do not be deceived by variations of form, such as Fig. 64, which is exactly Fig. 62, or Fig. 65, which is exactly Fig. 57. In the United States the receiver uniformly hangs at the left of the telephone set, the hook end of the switch lever being therefore at the left. The reversal of the switch lever, placing the hook at the right, usually conveys no meaning and is not a desirable variation, even if not objectionable. See Figs. 61 and 62.

Fig. 66 is Fig. 58 drawn more simply, and in which the "down position of the hook lever is indicated by the slope of the line representing it. (Note, however, that

this is confirmed by the electrical condition of the contacts, and note also that if it were not so confirmed the switch lever would be "up" regardless of its slope.)

The symbol of Fig. 67 shows a mechanical construction of hook lever in which the position of the pivot must be considered to determine which contacts are to be closed when the hook lever is up and when down. The contact shown electrically closed indicates that the hook lever is down; the spring at *e* is the tension spring to draw the hook lever up when the receiver is removed, yet in spite of the fact that the receiver is not shown in its place on the hook, and that the spring is shown to draw the lever up when the receiver is not hung upon it, and in spite of the fact that the contact *above* the hook lever is closed and the contact *below* the lever is open, yet the hook is down because the electrical condition of the contacts so decide the question. This symbol is offered as an example of confusing construction which may puzzle the beginner; however, it yields to analysis and will fulfill its purpose in any circuit diagram of which it may form a part. By moving the hook end down the electrical conditions of the contacts are not changed. By moving the hook end up the projection rearward of the pivot, *d*, and at the other end of the lever, will of course move downward, and the electrical conditions of the contacts will be changed. The hook lever, as shown, therefore, is down.

Figs. 68, 69 and 70 are presented as characteristic of types of hook levers and switches frequently met, and the student is given an opportunity to analyze each of them on his own account, the analysis proceeding by determining what electrical conditions would be entailed by moving the hook end of the lever up or down.

Hook switches having contacts of the second class, are presented in Figs. 71, 72 and 73. In each of these symbols a group of switching springs is mounted adjacent to the hook lever, and some sort of mechanical engagement is provided whereby the electrical conditions of the switch contacts may be changed by the upward or downward movement of the hook lever. The student is invited to analyze each of these diagrams, also, to determine in each whether the hook lever, as shown, is up or down.

Special transient conditions of switching may be shown by the hook switch. Such transient conditions are met frequently in telephone practice where a temporary condition for calling the central office or signaling for disconnection is made a function of central office apparatus, and the central office apparatus then is controlled by a momentary condition set up at the substation as the hook lever passes either upward or downward.

Figs. 74 and 75 show arrangements of contact springs to give a momentary contact condition during the movement of the hook lever, which condition does not exist after the movement of the lever is completed fully.

In Fig. 74 the conductor *h* is in connection with the hook lever *g*, and as the lever moves upward it makes connection with the contact point *f*, thus connecting *g* and *h* and *f;* this connection is but temporary, since before the hook lever reaches the limit of its movement the tip of the curved spring to which conductor *h* is connected engages the black projection (black indicates insulation), and thus the spring is held back and the downward tooth upon the hook lever is permitted to move out of engagement with the spring; this breaks the connection between *h* and *f* and terminates the temporary condition. The connection with contact *i* is made also, but seems to have nothing to do with the transient condition. Upon the downward movement of the hook lever the condition is repeated, the electrical results being the same, but the contacts being made mechanically in reverse order.

In Fig. 75 hook and lever *m* engages the contact of the upper spring k and mechanically lifts it from the spring *l*. Of course, electrical connection between *m* and *l* through *k* exists momentarily, and this is repeated by the reversed contacting and breaking when the hook lever moves downward.

In switches of the type of Figs. 71, 72 and 73 similar conditions of the consequent making and breaking of the switch springs may be attained in a manner which will be obvious after switches of various types have been studied.

Special mechanical devices forming parts of the hook switch, or associated with it, are shown in Figs. 76, 77 and 78. In Fig. 76 a pin projects from the hook lever and rubs against the vertical bent spring just below it, thus connecting conductors *n* and *o* when the hook is part way of its movement, the pin coming to rest either above or below the bent portion of the spring when the hook lever is at rest. All of this is indicated in the symbol, but when this symbol is a part of a complete diagram this action may be confirmed by the consideration that the circuit in which it is found requires such a condition at the hook switch to make the other parts of the circuit diagram operative.

In Fig. 77 an insulated projection upon the hook lever presses the vertical spring to the left and against the shorter vertical contact member, thus connecting electrically the two conductors *r*.

In Fig. 78 the three conductors *s* are connected momentarily as the hook lever passes downward, but not when it passes upward. As the hook lever passes upward the vertical spring at the left is pressed away from its two companions; as the hook lever passes downward the spring at the left is pressed toward its companions.

Where no special mechanical details or requirements of the hook mechanism are to be shown the symbols of Figs. 59 and 60 are preferable.

Hook switches in desk stands, where the space for the mechanism is necessarily restricted, and in intercommunicating or "house" systems, where special automatic switching conditions are to be met and cared for, and in automatic telephone exchanges, may have such conditions as call for special symbols embodying more or less of the mechanism of the whole telephone set. It is likely that in every instance the symbols all can be deciphered and understood by an analysis first of the requirements of the remainder of the circuit, which must be met by the hook-switch device and by the application then of the principles of analysis gained from the study of the specimens of symbols here given.

(To be continued.)

Telephone Coupon Books

The attorney-general's department, State of Minnesota, has held that the Northwestern Telephone Company cannot continue to sell reduced rate telephone coupons without violating the laws of Minnesota. The company asked the attorney-general if the selling of coupons good for $10 to $25 worth of talk at a reduction of 10 to 25 per cent from the usual rate was lawful.

Convention of Northwestern Cedarmen

The Northwestern Cedarmen's Association met at Minneapolis January 12, in its thirteenth annual convention. President A. T. Naugle opened the meeting and gave a short but optimistic address on the prospects of the coming season. He spoke of the difficulty experienced with the railroads as to overweight claims on eight-inch top poles, and suggested the preparation of weight tables for this size of pole. He also commended the work of the insurance committee and other committees of the association.

Secretary M. O. Nelson in his report presented a number of interesting facts concerning insurance rates, their regulation and reduction; the work of the inspection service of the association in grading poles and settling disputes; the issuing of a new western freight rate book, and the compilation of estimates as to the probable cost of cedar this winter.

A vote of thanks was tendered to E. L. Clark as chairman of the Insurance Committee for the efficient work of that body in decreasing insurance cost.

The committee on advertising reported that after thorough consideration of the proposal to effect a saving to the association members by a system of joint advertising it was concluded that such action would not be feasible, owing to the variation in the advertising appropriations of different concerns.

It was voted, on the motion of W. C. Church, that the secretary of the association act as an information bureau, and that information reported to him as to cancellations and complaints not just should be placed before the members of the association.

J. W. Benham reported for the railroad committee recommending that the association pass resolutions, condemning the railroad regulation of 40,000 minimum as unjust and instructing the committee to take steps toward obtaining a modified regulation. The report was accepted and placed on file, to be taken up as new business.

E. L. Clark suggested that the members of the Idaho association, who number only eight, be invited to join. This also was placed under the head of new business. A motion was offered by T. M. Partridge, collaborating with Mr. Clark, that the directors of the association lend moral support to the organization of new telephone companies and their applications for franchises. This was carried.

The initiation fee of the association was raised from $25 to $100, after some discussion. The president then appointed H. S. Gilkey, L. A. Page and H. F. Partridge a committee for the investigation of desirable changes in the classification of books; such reports to be made to the board of directors for the action of that body in authorizing the suggested changes.

P. W. Raber, J. E. Gerich, William Mueller, Jr., C. H. Worcester and M. H. Coolidge were appointed a nominating committee to report at the session of Wednesday, January 13.

Tuesday evening the Minneapolis members gave a banquet to about fifty of the association members and business men of the city. H. S. Gilkey acted as toastmaster and Judge F. V. Brown and A. T. Naugle were among the speakers of the evening.

In opening the Wednesday session the committee on poles and piling recommended that the weight of seven-inch top poles of any length be adopted as a standard for eight-inch top poles five feet shorter. This was accepted.

R. R. Genge was instructed to represent the association before the Michigan State Railway commission at Lansing, January 21.

The following officers were elected to serve for the ensuing year: President, E. L. Clark; vice-president, T. M. Partridge; treasurer, W. B. Thomas; directors, J. W. Benham and A. D. Watson.

K. B. Miller on Telephone Development

Kempster B. Miller addressed the noonday meeting of the Chicago Electric Club January 13 on "The Development of the Telephone Industry." He took as a specific example of general development Chicago. The Chicago Telephone Company now has approximately 180,000 telephones connected, being the second largest exchange in the world. The growth last year amounted to 35,000 instruments, which was equal to the entire growth of the first 23 years of the company's existence. Within a radius of 20 miles of New York City there are more telephones than in all the British Isles. Chicago has the busiest telephone exchange in the world, if the number of calls per subscriber is taken as a measure, the average being 22 calls per line per day. There are 35 exchanges buildings. The underground conduit amounts to 435 miles, there are 377,000 miles of underground wire, and the overhead wire foots up to 65,000 miles. The company employs about 5,600 operators.

Mr. Miller said that the automatic exchange system had proved a success in a number of large exchanges, and that it is being installed in other very large exchanges. A compromise between the purely automatic and the manual system is the semi-automatic. On this system the numbers are given orally to a telephone operator, who is provided with automatic apparatus for making the connection to complete the call. Mr. Miller seemed to think it certain that the manual system would be superseded either by the automatic or semi-automatic systems.

Telephone Helps the Red Cross Stamps

Nearly everyone is familiar with the little pasters or stamps bearing the mark of the Red Cross, whose sale is to aid in the establishment of a fund for the warfare against tuberculosis. They are sold everywhere, and in nearly every way, and a good proportion of the holiday packages that traveled by post and express were decorated with one or more apiece. In Cleveland they are selling them by telephone; and an efficient salesman the instrument seems to be. In one day, December 29, 45,000 of the bits of paper were sold over the wire, and the telephone company is offering every assistance in furthering the sales.

New Omaha Ordinance

The city council of Omaha, Nebr., has passed an ordinance providing that any person who shall willfully annoy any other person by ringing or causing to be rung any telephone bell, or who shall call or cause to be called any person over any telephone in the city of Omaha for the purpose of annoying such person, or who shall use profane or obscene language over any telephone in the city of Omaha shall be deemed guilty of a misdemeanor and, upon conviction thereof, shall be fined in any sum not exceeding $100.

Some Questions Answered

By J. C. Kelsey

The trouble which occupied so much space in January TELEPHONE ENGINEER has been located. I ran it down on Sunday on the principle that "the better the day the better the deed." I put through twenty-five volts from the exchange to the power plant; and with a three-volt scale voltmeter I got nothing from one phase of the lighting circuit, but on the other phase I got from zero to three degrees deflection to ground. The power at the plant was then turned on and I went out along the line and found a primary lead swinging into a secondary. The secondary pair feed the court house and go underground. The ground was found on the secondary. The test played havoc with the telephones while the light people were putting on 2,200 volts, but I found my trouble.—S. E. C., Iowa.

"The better the day the better the deed" is good; but who was the comforting philosopher who had the public service official and worker in mind when he uttered this remark? I wish I knew, because Sunday morning finds me doing this.

In former days when I shoveled coal into hungry boilers, it seemed that Sunday evening was the hardest time of all. I ascribed it to early training and conscience, because the first thing the learning youngster confronts is "six days shalt thou labor and do all thy work." Probably this was the reason the church officials were always complaining about the light being dim.

But your maxim came before the advent of lighting facilities. It was written before life got so complex. A man fished for a living or tilled a small piece of ground, and could easily lay off on the seventh day. Now he uses the telephone on the seventh day, and kicks loud and long because Sunday service is slow.

So when you made the Sunday test, you were justified, and we will even encourage you to do more. You certainly did prove that a ground existed on the power lines. According to your first letter, the two machines were exactly alike, but one made more noise than the other. In an ordinary elimination analysis, it would go to prove that one of the machines was wrong. When you mentioned that one of the machines had been rewound, the story was plain to me that it must be external ground line trouble on the electric light service. The wave forms of the machines are different, and the latest one is an improvement, as far as the telephone is concerned. When the first common battery exchanges were put out, the storage battery plant usually was charged at night, because the noise of the running machines bothered the least number of talkers. The charging machines were of the ordinary type, had few commutator sections, and ran at ordinary speed. As a consequence, the sensitive telephone interpreted the changes in the pressure as noise. The new machines have numerous commutator sections, and run at such a speed that the vibrations, or changes, exceed 5,000 per second, which renders the telephone receiver powerless to interpret such a high rate. Hence, one can charge in the day time.

While the machines in question are ordinary 60 cycle, it is plain that the telephone would be disturbed, for that is considerably below 5,000. But one machine made more noticeable noise than the other, because its wave form was more ragged than the other. The noise in the receiver was more noticeable, because of a difference in the number of minor vibrations per second.

The court house people should be glad to have that cross removed. A man ordinarily would not like to fondle the lamp in his house, if he thought that 2,200 volts were exerting an effort to ground through him. When acting as an electrical inspector in a city, my attention was called to a joke, a fatal one too, in which some practical jokers had connected the secondary circuit to a receptacle which the employees used. While washing his hands, one of the boys fell dead. We found a cross between the primary and the secondary, just as you did at the court house.

Out west, the telephone is used as a trouble detective. Paralleling the 60,000 volt line is the telephone. The line is quiet as long as the high tension circuit is balanced. When a little leak occurs on the power line, the telephone hums in proportion. The trouble department hunts the defective place at once, and clears the trouble before a real ground occurs. If the hum is neglected, the ground on the power line has a chance to develop into a real ground, and the hum of the telephone develops into a roar. Then there is a scurry to hunt the trouble.

We have a bridging line, ground return, about 65 miles long, with the switchboard located near its center. One portion of the line has seven telephones on it and is 35 miles long. This portion is working well; but the other, which is 30 miles long with nine telephones, has been giving us trouble. The bells on all the instruments ring feebly, and even talking at times is indistinct. The lines are properly run, and there are no interfering trees, so I fail to see where a ground could exist. Do you think it is from a bad joint? I have tested all instruments on this section, and find them O. K. A few of the telephones seem to ring harder at some times than at others. At the time the switchboard was installed the extreme telephones could ring each other; now even those on the defective half of the line cannot.—G. A. H., Jamaica, British West Indies.

This condition, composed of two bridging grounded lines cut in through a switchboard, seems to be a case of swinging or varying ground. On the crippled section, your question reveals that the generator pulls hard, and at times, does not. This could be due to a bad joint, at least one bad joint, because the telephones on each side of the joint would work well. From this distance, with the information at hand, it looks like a ground.

While it is hardly fair to swing my experience in on you, I will tell you of a big trunk line between two fairly large cities, which carried fifty pairs of wires, and always had line trouble, coming and going. My trouble gang would go out and look all over the line, and report nothing wrong. I finally got disgusted with the amount of the trouble, and personally inspected each pole with any guy wires. I did not inspect from the ground, but climbed up the pole, and looker over the construction carefully. I found that there were over twenty side guys that, when the wind blew against their tension, would pull up into contact with the trunk wire, and ground it. Of course, as this line paralleled a trolley for a few miles, noise resulted.

In your case, a ground would not cause noise, as you have but one wire, and besides have no trolley disturbance. I should be inclined to advise you to go over your line, every foot of it, and investigate every possible opportunity for grounding.

In a late periodical I read the following, which does not appear consistent with what I have been led to believe by experience: "When considering transmitters for local battery work, the question as to which is the better, a high or low resistance button, is one that should be taken into account For a number of years, it was thought necessary to use a low resistance granular button for local battery work, and a high resistance button for common battery. At present, a certain company uses the high resistance button for local battery work, and it is found in practice that about the same volume of transmission is obtainable as with the low resistance button when the same amount of battery potential is used. The reason for this is that a greater percentage of change in the resistance in the primary circuit is obtainable with the high resistance button, and, although the initial current value through it is less than the low resistance button, the large percentage change in resistance compensates."—P. O. B., New York.

We also read the article you mention. It is all bunk. Why not go further and make the transmitter have 1,000 ohms, or at least, all the resistance you could put into it? It might be possible to have a transmitter that would require no battery current at all!

In the primary circuit there are three things, the battery, the transmitter, and the primary of the induction coil. The resistance of the dry cells and the primary of the induction coil are about the same—about a third of an ohm. If the transmitter has a resistance of twelve ohms, then the battery current potential expends its energy at three terminal pairs.

As twelve is thirty-six thirds, and each of the other parts have one-third ohm each, there are thirty-eight parts to the primary circuit. Then one thirty-eighth of the potential is lost at the batteries, thirty-six thirty-eighths are lost in the transmitter, and the remaining one thirty-eighth is expended at the terminals of primary winding. Already more than ninety-seven per cent of the energy is lost, while the remaining three per cent acts on the actual talking circuit. You have heard that only one-half of one per cent of your originating energy is needed at the receiving end. We should be thankful that is true, on the hypothesis that the article is correct.

Supposing the high resistance transmitter measures normally forty ohms. Then the battery takes 1-124 of the pressure in the primary circuit; the transmitter takes 122-124, and the primary gets the remaining 1-124 or less than one per cent.

The terminals of the primary are the brushes of the alternating current generator which furnish the energy of the talking circuit. It all reminds me of the early homestead days when grasshoppers ate everything on the outside but the doorknobs. There were some settlers who helped the needy in the rush of relief, but ninety-five per cent of the relief was used up by the charitably inclined people who took it upon themselves to receive the gifts from the east.

We start out with two dry cells, and even interpose a low resistance primary path, and then insert a great hoggish device to use all the energy itself.

You make up your mind that as the small telephone exchange proprietor merges with his neighbor, he will need some long distance service over iron lines, and most likely old mother earth will carry some of the energy. Then your low resistance transmitter will get the business.

Quarreling over consumption of current to be used by a train dispatching system is as foolish as arguing as to the number of angels that can carry on an Isadora Duncan dance on the point of a needle. It has long since been determined that one cannot get something for nothing. If one buys a six per cent stock, and gets the six per cent regularly, he feels like the world was growing better. It all gets back to energy, of getting something for something. If one wants to talk far, he has to furnish additional energy. This very point has been proven by the Bell system. Double the current supply is furnished to people wishing to talk beyond the confines of the city.

The article mentioned goes further and tells about the use of tapering coils for a bridged copper line. It argues that the station closest to the train dispatcher would take all the current from the remotest station, which is only twenty-five miles away.

What gives it away; this tapering business? A low resistance transmitter does not need tapering coils. The high resistance transmitter will never do for railroad work and it will not take long to demonstrate it. In fact it is now being demonstrated, because several railroads already have rejected the very transmitter system mentioned in the article.

The South Dakota Independent Convention

The convention of the South Dakota Independent Telephone Association was held at Yankton, January 13. Judge C. B. Kennedy, president of the association, told of the important work of the association during the year, and of the successful outcome of hearings before the State Telephone Commission.

Secretary E. R. Buck reported an excellent financial condition and predicted a prosperous year.

Telephone companies admitted to membership in the association were: Canova Telephone Company, Springfield Telephone Company, Stickney Telephone Company, Parkston Telephone Company, Groton and Ferney Telephone Company and Brookings Municipal Telephone Department. The Dakota Central Telephone Company was stated by the president to have refused compliance with the rules of the association and was dropped from membership.

Some of the papers read and discussed were: "The Proper Treatment of the Local Exchange by the Toll Company," by A. S. Hall; "The Cost of Furnishing Rural Telephone Service," by Theodore Holein, and "Cedar Poles," by L. L. Hill. The discussion of toll rates and commissions disclosed the fact that toll rates are much lower in the southern than in the northern part of the state. This is due to competitive conditions in the southern counties.

The old officers of the association were re-elected, as follows: President, C. B. Kennedy; vice-president, J. A. Steninger; secretary and treasurer, E. R. Buck; executive committee, P. C. Cockerill, H. P. Hartwell, M. B. Ryan and A. S. Hall.

The convention closed with a banquet at the Portland Hotel.

A Heroine of the Telephone

Mrs. S. F. Rooke, a telephone operator at Folsom, Colorado, gave her life to save others from the great floor that overwhelmed the valley a few weeks ago. She received notice that the water was coming in ample time to allow her to escape, but she stayed at the telephone, calling up the different households in the valley and warning them to flee, until she was swept away by the flood. Her body was found twelve miles down the canyon with the telephone headpiece still gripped to her ear. More than forty persons testified the next morning that they owed their escape to her.

Who's Who in the Telephone Game

WEST VIRGINIA is one of the crookedest states on the map. When everything else had been surrounded with symmetrical lines, done to fit some fanciful idea of what a state should look like, the geographers found that there was a lot of ragged space left which was almost wholly surrounded by the Ohio, Potomac, Big Sandy and Chattarawha rivers and the Shenandoah, North, Front, Little, Potts, Great North, Big Stone and Peters mountains, so they let it go at that and called it West Virginia. There wasn't more than two inches of perpendicular boundary, but that didn't matter. That other little bit was on the bias, in fits and jerks, and it all pointed northwestward—if you wanted to insist upon its pointing that way. The map-makers meant to have a very crooked state, and they certainly got it.

But you can't put a handicap on a flat-footed, high-minded, square-jawed American citizen by drawing an irregular line around him. Being born in a crooked state doesn't imply that a man is crooked, by a long shot, for that's where Joe Edwards was born. If you think there's anything crooked about Edwards, whisper it down a cellar somewhere after dark. It wouldn't go down anywhere else.

"He Dotes on Special Tools and Ducks, but He Gets the Tools First."

Joseph Blackburn Edwards got away from West Virginia at an early age, which was a distinct loss to the commonwealth even then. He assimilated learning from the schools of the state which makes a specialty of breeding presidents—which isn't a very bad omen, either. But when he was going to school in Ohio, among the other things that he took on and took in was a distinct fondness for mechanics. That early side-line developed a power plant out of his mother's sewing machine and a sawmill out of his grandfather's clock. As the twig's inclined, the tree is bent, so he took a position in a factory at Springfield where sewing machines were being made and repaired. It wasn't long before he was a department foreman of the Cincinnati Sewing Machine Company, at Cincinnati, Ohio.

But the memory of that old clock as a plaything haunted him—it was more intricate than a sewing machine. From the north side of the Ohio river he could see the sign of the old Dueber Watch Case Company, across the Ohio river in Newport. He hiked over there one Saturday afternoon and went to work the next Monday morning in the mechanical department of the watch company. And speaking of hiking, if there is anything Joseph Edwards prefers more than that, nobody has found it out, unless it is a special brand of dear old west-side rope which he smokes. He regards street cars as needless, extravagant luxuries. His contempt for shoe leather is something terrible—so he takes out his revenge upon it and walks. He always walks except in extreme cases. We believe he did ride during a certain troublesome period a few years ago, but it was always on the seat with the driver in charge of freight consignments. The impediment was a mob with a brick in its hand. You may have heard about it.

Anyway, from Newport he joined the mechanical force of the Elgin National Watch Company at Elgin, Illinois. He was following the direction of those little biased West Virginia boundaries. From Elgin, his next shift landed him in Pittsburg with the Westinghouse Company. He was engaged in special tool and contract work on the Shellebarger wattmeters. Please note first, right here, that Jos. B. had been doing grimy work in grimy cities. He wasn't afraid of overalls and a jumper jacket. Also please note, second, that in Pittsburg he bumped into special tools and electricity. That was his undoing. He is "bugs" on special tools. He invented a left-handed crowbar, just to show how easy it was. No trick at all for him to make a special tool. All that he needs is the money to back it up. If he wants to put something over in the *de luxe* class, he keeps right on spending money for a special tool till he gets the thing into an Edwards' class A class—so distinctive that a competitor gives up before trying to make the effort. If it costs a mere $20,000 to build a special tool to pull out $\frac{87}{100,000}$ of an inch more of elbow, shoulder or hip on a particular and very special piece of apparatus, he builds that special tool. There isn't anything stingy about him. He dotes on special tools and ducks, but he always gets the special tools first. His fondness for ducks is almost a mania. He has been known to have a cold that made him limp, but if someone proposed a duck hunt right there, he would go out and stand in ice water half a day just to get a shot at one.

In 1890 he joined the Western Electric Company at Chicago in charge of the tool department. Within six months he was buyer of machinery, tools and supplies; in charge also of supply centers and inventories. Three years later he was assigned to the company's European plant—the largest on the continent—at Antwerp, Belgium, in the capacity of shop superintendent. A year later they called him the works manager, because by that time he managed the works. In 1898 he came sailing back to this country and entered the Chicago office of the same com-

pany, where he engaged in organizing systems for the supply and control of productive work, material and equipment. In the new position he also had charge of the shop inventories.

In October, 1901, he entered the Kellogg Switchboard & Supply Company as shop superintendent. He made such a splendid shop superintendent that two years later he was appointed general superintendent, and only a little while after that he was elected a director. He is occupying these positions now. His operations are likewise dignified from a squat position in the basement to the better vantage of a swivel chair in his private office. He never hollers till the thing is finished. His capacity for a day's work always depends upon the number of hours there are in a day. If he can put in thirty hours it suits him better than if there is only a skimpy sixteen or so.

He actually loves the telephone. When you are downhearted about the business, send for some of J. B. Edwards' tonic. It is guaranteed to dissipate the worst disorder of telephonitis, immediate, prospective or otherwise. And when you want to know how he makes a telephone, let him show you. Edwards isn't a Missourian, as we've already hinted. Among his varied achievements he has had time to make a special tool with which he has reconstructed that rather disconcerting tenet, "Show me," to a more pleasant one, which fits him better; and his personal use of it, so far as making telephones goes, reads: "I'll show you!"

Telephones to Turkey

The greatest evidence of Turkey's benighted condition has been the Sultan's refusal to allow any telephones in the country. But now the embargo is raised. According to Vice-Consul General Heizeer, Constantinople, the Turkish government is looking for someone who will undertake the installation of a complete telephone system throughout the empire. Soon after the establishment of a constitutional government in the Ottoman empire, an order was issued abolishing the former regulations prohibiting the telephone, and the Turkish government has been receiving bids on a complete telephone concession for the entire country.

Preliminary Report on Telephones

A PRELIMINARY report on telephones of the United States, exclusive of Alaska, Hawaii, the Philippine Islands and Porto Rico, has been issued by the Bureau of the Census of the Department of Commerce and Labor at Washington, D. C. The report bears the date January 29, 1909, and the director in charge is S. N. D. North.

The statistics relate to the years ending December 31, 1907 and 1902. The totals include reports of all commercial and mutual systems and farmer or rural lines, but do not include reports of telephone lines operated by steam and electric railways; nor do they include reports of isolated systems operated exclusively for the benefit of commercial and manufacturing enterprises, federal, state, and municipal governments.

The final report for 1907 will contain an analysis of the above totals and present detail statistics for other phases of the industry.

	1907.	1902.	Per cent of increase.
Number of systems and lines (1)	22,971	9,136	151.4
Miles of single wire	12,999,369	4,900,451	165.3
Number of stations or telephones, total	6,118,578	2,371,044	158.1
Bell (American Telephone & Telegraph Company)	(2) 3,132,063	1,317,178	137.8
Independent (non-Bell)	2,986,515	1,053,866	183.4
Number of public exchanges	15,527	10,361	49.9
Number of switchboards, total	16,065	10,896	47.4
Common battery system	2,146	837	156.4
Magneto system	13,801	10,005	37.9
Automatic	118	54	118.5
Estimated messages or talks during year, total	11,372,605,063	5,070,554,553	124.3
Local exchange messages	11,119,867,172	4,949,849,709	124.7
Long distance and toll messages	252,737,891	120,704,844	109.4
Total income (3)	$184,461,747	$86,825,536	112.5
Total expenses (including taxes, interest, and fixed charges)	$140,802,305	$65,164,771	116.1
Total cost of construction and equipment, including real estate and telephones	$819,667,008	$389,278,232	110.6
Capitalization:			
Capital stock authorized, par value	$1,121,931,023	$384,534,066	191.8
Capital stock outstanding, par value	$512,685,265	$274,049,697	87.1
Dividends on stock	$23,733,670	$14,982,719	58.4
Bonds authorized, par value	$556,537,932	$158,099,094	252.0
Bonds outstanding, par value	$301,930,739	$73,981,361	308.1
Interest on bonds	$12,316,109	$3,511,948	250.7
Total par value stock and bonds outstanding	$814,616,004	$348,031,058	134.1
Employees and wages:			
Salaried employees, number	25,298	14,124	79.1
Salaries	$19,298,423	$9,885,886	95.2
Wage-earners, average number	118,871	64,628	83.9
Wages	$48,980,704	$26,369,735	85.7

1—The statistics of farmer or rural lines included in this report are confined to number of lines, miles of wire, and number of telephones: 1907—17,702 lines, 486,294 miles of wire, 565,649 telephones. 1902—4,985 lines, 49,965 miles of wire, 55,747 telephones. It is probable that a more thorough canvass was made of these lines in 1907 than in 1902, which accounts in part for the large increase.

2—Exclusive of 85,287 farmer or rural stations receiving exchange service through switchboards of "Bell" Companies. A large proportion of these stations were reported as and included in total stations for independent (non-Bell) Systems.

3—Includes assessments of mutual systems.

Some Curious Uses of the Telephone

By J. Rodney Bates

PERHAPS the title of this article is something of a misnomer. After all, the telephone is but an extension of the human tongue; and in whatever direction that member finds occasion to wag, it should not be surprising to find its electrical accessory in operation.

The church telephone is a comparatively new thing in this country. Considerable press comment was brought forth recently by the installation of a complete telephone system in the aristocratic First Methodist Episcopal Church of Evanston, Ill. The Rev. Dr. Timothy P. Frost, its pastor, was led to this innovation by the growing deafness of one of his oldest parishioners. In reality, the church telephone system is but half a system—the pupit being furnished with a transmitter only, while each pew is provided with a conveniently placed receiver. In England the idea has been extended to a connection with the city lines, and has met with such favor that the London telephone subscriber, by the payment of a special fee of £5 per year, is entitled to a connection with his favorite church, whereby he hears the sermon and enjoys the hymns at ease in his own dwelling—and escapes the passing of the plate. For £10 a year he may request the operator for the theater switch, and listen to the strains of grand opera, in his slippers and dressing gown.

Mention of the opera recalls the efforts of the stage manager of New York's Metropolitan Opera House to give life to the green dragon in Wagner's "Siegfried." The two small boys whom he stowed away in the animal's interior seemed unable to harmonize their actions until each was provided with a head telephone of the operator's style, connected by a pair of fine wires with the transmitter of the manager in the wings. His orders being thus received at the several psychological moments in the career of the dragon, failure was impossible, and the beast was tamed at once.

In the same technical category with church and theater telephones is the system recently installed in the private barber shop of a great Chicago establishment. No chairs for waiting customers are provided in this shop, for its customers have no time to wait. When the operations on one patron are drawing to completion the porter rings up "next" on the house telephone; and the recipient of the call, appreciating the honor, hurries to his shave or hair trimming.

Chess games by telegraph are as old as the use of the wire; and now the rural communities are emulating the aristocratic example by inaugurating tournaments of checkers by telephone. So played, the game is declared to be fully as exciting and almost as fast as when played across a single board; and it certainly makes the long winter evening in the country go quickly.

Not long ago a southern newspaper contained an item to the effect that two souls four hundred miles apart had been made one. Only the ubiquitous telephone could have been responsible for this most modern wedding. The blushing bride, one of the belles of Winchester, Ky., stood alone before the clergyman; and as the firm "I will" came over the long distance wire from Hampton, Va., the knot was tied. How soon thereafter the happy groom "rang off" does not appear.

In the natural course of events lives are saved every day by the timely use of the telephone. Its studied application to the prevention of disaster is a work in a class of its own. Such is the system installed by the monks of St. Bernard in the Great St. Bernard pass across the Alps. The shelter houses established long ago by those good people, so that wanderers who are caught in a storm or have met with injury may not perish in the drifts, have been made famous in verse and prose. Now each little hut is provided with a telephone; and at the other end of the line the good angels of the hospice are always waiting for the call of distress, ready to bring what help they may to the hapless traveler.

Perhaps it is permissible to include in the same class that wise provision of the French navy in equipping all submarine boats with telephone buoys. Now if a submarine goes to the bottom and is unable to rise a buoy is released, either by the imprisoned crew or automatically. This buoy is of a type readily recognized; and the surface boat that hastens to the floating signal of distress finds within it a telephone, by which instant communication is had with the submerged sailors, and half the battle of rescue is won.

Considerable ingenuity has been displayed in adapting the telephone to various fire and burglar alarm systems. As curious as any is the arrangement used in Wenonah, N. J. If a burglar is discovered within the confines of the village, it at once becomes the duty of the discoverer to notify the telephone exchange. Upon receipt of such a message the operator immediately throws a switch; and high in the air above the center of the village square shines instantly a great red light. The night watchman, wherever he may be, responds to the luminous call; those inhabitants who are awake seize their weapons, and the chase is on.

After all, it is the dweller in the rural districts who, depending even more upon the telephone than the city man, teaches us new ways of making the wire an efficient servant. Marshal Frank Bullock of Millville, another New Jersey community, has actually arrested his man by telephone, and brought him to trial. Called to the neighboring hamlet of Maurice River to make an arrest for disorderly conduct, he found that his quarry had gone home to Delmont. Knowing nothing of the man but his name, he called up in the latter place and asked that the culprit be sent for.

"I have a warrant for your arrest," said the marshal, when identities had been disclosed. "Shall I come to you or will you come to me?"

"I'll meet you on the next train," replied the man. And he did.

The next step in the procedure is the trial, conviction and fining, or acquittal of the unconfined prisoner by telephone. That this seemingly Utopian scheme has been carried out successfully in a number of cases is a matter of record. Where the offense is a minor one and the offender perhaps a well known farmer in the midst of his harvesting, the case presents no difficulty to the astute country justice.

"Hiram Hardacre," he will probably say over the wire, "are you guilty or not guilty of the offense as charged?"

And the farmer thinks of his harvest, and of the

time it would take him to be brought into court and tried, and he telephones back, "Guilty, your honor!"

"Ten dollars and costs," remarks the court; and within a few hours one of the children comes into the chamber of justice with the amount, and the incident is closed.

Patents have recently been granted on a portable telephone with a miniature reel of fine cable, for the use of fire chiefs in large cities; and on a wire connection woven into the fabric of fire hose. The city of New York at present employs a system of telephone orders whereby the water pressure at any point in the city may be instantly increased to three or four hundred pounds per square inch. And with the perfecting of the new devices so that the chief may telephone his order to headquarters while actively participating in the work of fire fighting, it is predicted that the fire engine will soon become obsolete.

As might be expected, the United States army has adapted the telephone to its own peculiar requirements. The now standard cavalry telephone is perhaps the most compact instrument ever devised. Two small leather boxes, not unlike field glass cases, contain all the apparatus, one holding the buzzer apparatus, battery, etc.; the other enclosing the complete telephone instrument. The curious part of the system, however, is the use of breast reels holding half-mile lengths of insulated wire, which unwinds and pays out as the horse gallops across the plain. Of course two wires may be used, forming a complete metallic circuit; but it has been found quite satisfactory to employ but one wire, with a ground return. In this case the ground side of the telephone is fastened to a piece of sheet copper. This copper rests against the horse's body; and as a ground connection is constantly established through at least one of the horse's hoofs, the circuit is unbroken. Whatever message is transmitted must then traverse the bodies and legs of two horses, which it does very nicely, even when the two cavalrymen are five miles apart. Furthermore, the horse remains perfectly unconscious of the part he plays in the circuit.

Probably the most pathetic use to which the telephone was ever put occurred in the terrible Jumbo mine disaster of 1907, when seven men were buried forever by a landslide of stupendous proportions. Every connection with the air, light and freedom of the outside world was cut off absolutely from the doomed men—everything but the telephone. Its wires, by some curious chance, remained unbroken. The entombed men were all of the Roman faith, and all realized that death was near. They asked absolution. The priest who answered the call remained at the telephone until the end—receiving their confessions, cheering and uplifting them, doing everything that was possible to mere speech to ease the terror of the last hour. No other telephone, it is safe to say, has ever transmitted the heart-wringings that passed over that buried wire.

All these are but examples of the curious uses to which ordinary telephone instruments may be put. Still more curious, perhaps, are the applications of the telephone principle to special purposes.

It is a peculiar property of the telephone receiver that sounds reproduced in it are audible to ears which have lost their sensitiveness to ordinary sounds. Accordingly, devices have been placed on the market for the use of sufferers from deafness, which are but modified telephones. It is even claimed for these that with their judicious use the defective ear may recover some if not all of its power in time, the auditory nerve being stimulated to fresh action by the vibrations of the telephone diaphragm. The instrument, battery and all, is small enough to be carried easily and unobtrusively in the pocket or waist, and the receiver portion is connected with the transmitter by a fine cord. While the receiver must be placed at the ear, the transmitter is merely arranged to face outward from the person, and may be entirely covered up without affecting its efficiency.

The use of a special transmitter in making phonograph records from a distance has proven quite successful, and conversely a special receiver may be used in connection with the phonograph to reproduce at some distant point the record of the latter. Some of the harsh overtones of the phonograph reproducer seem to be lost or sensibly mellowed down in the transition.

Consul Louis Goldschmidt, of Nantes, France, makes the report that a use for the telephone in fishing has just been invented in Norway. A microphone, the role of which consists in amplifying submarine sounds, is shut up in a thin, water-tight steel box and kept in constant communication by metallic wires with a telephonic receiver installed on the fishing boat. It is stated that with this apparatus the fisherman is always informed of the approach of fish. Moreover, it is said that each kind of fish gives in the instrument a particular sound. Thus the arrival of herring is signalized by a sort of whistling; the codfish announces its arrival in the neighborhood by a sort of grunting.

A similar device has proved useful in locating bell buoys in a fog, the microphone being rotated until the sound in the receiver is at its maximum, and the direction noted.

Somewhat similar in use and action, although different in construction, is the telephonic device for the detection and location of metallic ore in the ground. Here there is no movement to cause waves to impinge upon the transmitter; the action is purely electromagnetic. Briefly, the principle of the device lies in the fact that two similar coils, connected in circuit with a transmitter, a receiver, a buzzer and a battery, may be so balanced against each other that each neutralizes the other's effect, and the receiver is quiet. If now one of these coils approaches a bit of metal or conducting substance, the lines of force around that coil are more or less diverted from their paths. By a sort of reflex electrical action, the current through the affected coil immediately increases; the circuit is thrown out of balance, and the receiver buzzes vigorously. This device is very sensitive. In fact, it is so sensitive that it has not yet achieved any commercial success, since it responds to the least bit of metal, or even a patch of moisture. Modified, it serves as a detector of spurious coins. A standard coin being placed a known distance from one coil, any second coin placed the same distance from the other coil must exactly balance the standard in weight and composition, or the telephone receiver will give its warning buzz.

It is perhaps not generally known that the telephone receiver is one of the most sensitive detectors of feeble currents known. Two dissimilar metals connected to a receiver and touched to the tongue will cause quite a click in the instrument, and wires led from the house gas and water pipes to the receiver produce a sound seemingly out of all proportion to the source of current—which is probably due to the difference in potential of the earth at the points where the pipes are buried.

These are but a few of the wonders of which the ordinary telephone is capable. Yet with the perversity of human nature the telephone subscriber sometimes

makes demands which are beyond the capacity of even this versatile instrument. Not long ago a Clark County, Indiana, telephone manager was requested by a young widow to install a telephone at the head of her husband's grave, as she was sure he wanted to communicate with her.

Co-operation Versus Competition

By A. Steelhammer

ECONOMIC problems of the present day which have but one side for consideration are very few in number. The problem of two telephone systems for a town versus a single telephone system for the same town, is one which may be considered separately for each town, city or community. Usually it will be found a problem where both sides may be looked upon and some favor found for each. Some fundamental principles surely are common to all towns.

In a town having but a single system of telephones any telephone in the town may connect with any other telephone in the town. Beg pardon. In a town having but a single system of telephones, any telephone in the town may connect with any other telephone in the town if the other telephone is not busy.

This brings the writer's mind back to personal experiences in a city of some 40,000 people, according to the estimates of the people themselves, in which he was located and where he was compelled to transact business with the tools at hand.

Our town had but one telephone system—a system which offered to its subscribers the privilege of connecting with an extensive and well equipped system of toll lines, and which also offered to each of its telephones the privilege of connecting with any other telephone in the town if the other telephone was not busy.

Our town had offices of the Western Union Telegraph Company and of the Postal Telegraph Company, but neither telegraph company had any extensive system of messenger call devices available for a patron's use when he desired to send a telegram, unless the telephone system were so considered.

There were in common use three methods of delivering a message to the telegraph company for transmission over its lines. First, the patron might call by telephone, asking briefly that a messenger be sent to get a telegram; second, the patron might call by telephone and transmit the entire proposed telegram by telephone, great care being taken in such an instance by the receiving clerk at the telegraph office in repeating and checking the message and the address to insure as far as possible the proper transmission of the message by telegraph; third, the patron might walk down to the telegraph office, or send his own messenger, or hire a hack.

The second method was the method generally used, and such use of the telephone lines terminating in the telegraph offices resulted in frequent and long connections, keeping the lines busy for a very large proportion of the time during the day and evening.

The local telephone exchange had some 2,000 telephones; each of the telegraph offices had one telephone line.

Let us consider the effect of this condition upon the telephone users, or, more specifically, upon the telegraph companies' patrons who were the telephone company's patrons also. The persistence of the "busy" condition upon the telephone lines leading to the telegraph offices resulted in a large number of messages being delivered to the telegraph offices by the patrons themselves or by their messengers. Further, it resulted in many telegrams not being sent at all, where the prospective patron was located at a distance, or where for any reason he found it inconvenient to send the message by messenger, and found the telephone lines so persistently busy that he could neither transmit his message to the telegraph office by the second method, nor call for a telegraph company's messenger. This congestion of traffic on the telegraph companies' telephone lines spelled not only inconvenience for the telegraph companies' patrons, but less business for the telegraph companies themselves.

Considering the effect upon the telegraph companies, we find a possible loss of telegrams because of the inability to reach the telegraph offices by telephone in season for sending the message, and the remoteness of the prospective telegraph patron from the office which might prevent his sending the telegram to the office by messenger. It is likely that actual losses which might be classified as traceable to such a condition as this were small, since in such an instance, to serve as an example under this consideration, it would be necessary that the occasion be such that the telephone user desired to send the telegram. But the psychological processes of the human mind are such that the desire itself is diverted by an appreciation of difficulty in the way of the attainment of the desire. Translated into language to fit the present case, even the smallest of difficulties in the way of sending telegrams would impede the development of the telegraphing habit in the customs of the people, resulting in an appreciable and permanent loss in revenue to the telegraph companies.

The foregoing considers the telegraph companies jointly. This is the proper basis for consideration, since it was the general custom among the business men of the town who had recourse to the telephone for sending telegrams to call first the telegraph company of their preference, and in the event of that telephone being busy, then to call the other telegraph office and thus to give the message to the second telegraph company as a direct result of the busy condition of the first company's telephone line. This, of course, was reciprocity and free trade, since each company had the same advantage over the other in taking its surplus business, in case one but not both lines were busy. It resulted also in an approximately equal division of the telegraph business transmitted by telephone to the two telegraph companies.

Considering the two telegraph companies separately, this congestion of their telephone lines probably resulted in approximately an equal division between them of the telegraphic business received by their patrons by telephone and any effort of either company to secure an advantage over the other company by obtaining a major portion of the telephoned telegrams would be defected in part by the mechanical regulation of the telephoned

business through the congested condition of the telegraph company's telephone lines.

Here the writer has laid before you as completely as possible the conditions which existed prior to the invasion of our town by independent telephone interests, which resulted in the building of a new telephone system.

The remedy for this specific phase of "one telephone" and "natural monopoly" is easily seen. Each of the telegraph companies, separately, should have put in and maintained as many additional telephone lines as the traffic would warrant. This would have improved the service to the telephone patrons, would have increased the revenue of both of the telegraph companies, and of the telephone company as well, and would have ended the trouble.

The nub is here: Did they do it? They did not.

Upon the advent of the service of the independent telephone company one of the new telephones was placed in each of the offices of the telegraph companies, thus doubling the telephone service; and still there was traffic more than enough for the two, so that two telephones of the independent telephone company soon were placed in each of the telegraph offices, giving a total of six telephone lines for a traffic which theretofore had been carried in part by the two previously existing lines; had been diverted in part by the congested condition of the lines, and had been lost in part by the impediment of inconvenience.

Although no definite data is at hand at this time, it seems certain that a greater volume of telegraphic business was transmitted to the telegraph offices by telephone than before the advent of the independent telephone company, and it is but reasonable to assume that because of the greater ease of sending telegrams the telegraph habit developed in the customs of the telephone patrons, and a greater total volume of originating telegraph business resulted. Such results, when attained by the addition of a new or second telephone system in any town, are to be classed as the results of co-operation, rather than of competition.

By the coming of the independent telephone plant, too, the telephone lines to the hardware stores were duplicated and better service was given to patrons calling for those lines by the relief of the additional telephones.

In such cities as Chicago and New York careful record is kept of busy calls upon lines where such calls are at all frequent. Specially trained contract agents are given data from this record and are deputed to secure contracts for additional lines where additional lines are seen to be necessary. Such effort to relieve overloaded lines usually is successful. Going still further, and still nearer to the goal of sufficient telephone equipment for each subscriber to handle successfully all of his telephone business, the measured service or "message-rate" contracts made of late in those cities provide for increasing the number of telephone lines automatically. In these subscriber's contracts, it is recited that when the number of messages per annum exceeds a predetermined number an additional telephone line will be installed by the telephone company without specific additional charge to the subscriber therefor.

What was needed before the advent of the independent telephone company was education. Not a paragraph in the local newspapers, nor a book to read, nor a "flying squadron" of a dozen book-agent-style telephone canvassers to write contracts for five hundred additional telephones, mostly in residences and serving therefore only to overload more heavily the telephone lines of the business houses. What was needed was a telephone system so complete and so well balanced in all its parts that it in itself would invite the patrons' use.

Such a telephone system educates every user. Every call and conversation upon it is a lesson to both of the parties to the connection.

Our town now has a telephone service given by two telephone companies which are co-operating daily to educate the people of the town to a further and further appreciation of the convenience and utility of the telephone, and to a wider and wider use of it.

While the two telephone companies may be competing between themselves, with their lists of subscribers about equal, the matter of competition is solely a private affair of their own; for publicly they are co-operating to give the people of the town what they want and what they need, namely, good telephone service and enough of it.

Independent Telegraph in Chicago

Aldermen on the Chicago council committee on gas, oil and electric light when they took up the two pending ordinances for independent telegraph lines between Chicago and St. Louis and Kansas City were surprised to learn that there is already a strictly local telegraph company doing business in Chicago under a council ordinance. Ross C. Hall, who appeared as attorney for the Illinois Telegraphic News Company, whose ordinance was introduced at a former council meeting, declared that his company had been doing business for years.

Attorney Hall said that his company had telegraph rights to operate in the loop district and so far had confined itself to ticker service. It has arrangements to use the lines of the Interstate Telphone Company from Naperville to Springfield and of the Kinloch Telephone Company from there to St. Louis. The company wants to go through the Van Buren street tunnel and on the Metropolitan elevated structure on its Douglas park branch to the city limits. A. K. Brown, president of the Kenwood Trust and Savings Bank, is president of it.

The People's Mutual Telegraph Company, composed of board of trade members, wants the same rights. It offers ten-word messages to St. Louis for 20 cents and to Kansas City for 25 cents, which is 10 cents a message less than the Western Union or Postal rates to the public, but the same as their rates to the board of trade.

A Peculiar Telephone Line

The telephone line to Regina Margherita Meteorological Observatory on Mount Rosa (the highest telephone line in Europe, being at an altitude of 14,598 feet) may be said to be neither overhead nor underground. It was found impossible to run it on poles, owing to high winds and bad storms which prevail at these altitudes. It was also thought to be impracticable to lay an insulated cable, as it would gradually sink into the ice and would make repairs impossible. The final solution of the problem was to lay a bare wire across the glaciers, and depend upon the insulating qualities of the snow and ice.

Factory Telephones

By O. N. Livermore

AS A time and labor saving device the telephone is without doubt supreme. Yet the man who is most addicted to its use on city and long distance lines is sometimes the last to see its tremendous advantages in the factory.

The term "intercommunicating telephone system" is commonly used to designate any method of telephonic communication between different parts of the same building or plant. Technically, however, this usage is not quite correct. Such a system employing a central switchboard and operator is properly a "private exchange." The true intercommunicating system is automatic in the sense that any desired connection may be made at any station by the person originating the call.

The private exchange system may be divided into two classes; that which is purely local, designed merely to connect the various departments with each other through a switchboard, and that which connects with outside lines, affording each department access to city and long distance lines.

The latter arrangement appears, at first thought, the most useful. Its advantages are many and obvious. Let us, then, consider its disadvantage as compared to the intercommunicating for the transmission of messages between departments.

It is a natural operating rule of private exchanges that outside calls receive first attention. Outside calls are desirable; yet in this case their frequency means proportionate delay of interdepartment calls. A secondary result of the same condition is that department telephones, having the privilege of outside calls, are more frequently busy when wanted on an inside call.

The true intercommunicating system is not subject to this condition. Its calling apparatus commonly consists of a series of jacks, which are numbered to correspond with the different departments of the plant. A plug, hung on a conducting cord, is inserted into the desired jack and the pressing of a button immediately rings the signal bell in the corresponding department. There is no shifting of responsibility; if no answer is forthcoming the called party either is not there, or he is deliberately ignoring the signal, which is improbable. Every department in the plant may be reached by simply transferring the plug, without removing the receiver from the ear. Some systems employ a simple switch instead of the plug and jacks.

The modern factory is a marvel of space and labor economy. But in few factories has system been carried to that final nicety which the modern office exhibits; by which even those officials not in constant touch with the day's work can place their hands at once upon any desired information. Instant availability is the first requirement for office records. Yet if the same principle can not be applied to the operations of the most remote factory department, the best of office systems becomes inefficient and unsatisfactory. The only means to its application is the intercommunicating telephone. By its use the office not only has every operation of the factory available for instant reference, but those departments which are interdependent are constantly hand in glove with each other. And the system works twenty-four hours a day. That is an added advantage over the private exchange in "rush" times.

The private exchange system has already been described. Connecting with outside lines, it is always a convenience; in some places it is a necessity. Under such conditions the most satisfactory arrangement is to restrict its use to outside calls, thus reducing the number of telephones to those actually needing that privilege, and for interdepartment messages install an intercommunicating system. Many examples of this dual telephone system are to be seen in well-equipped plants, yet it is doubtful if any of them were installed without many a protest from some part of the management. A large Chicago concern which at first scouted as ridiculous the idea of installing a system which practically paralleled the private exchange system already in operation, and later tried a few telephones as an experiment, now has an intercommunicating instrument on every desk.

"Use it?" exclaimed the manager when asked if it was giving satisfaction. "Why, there is nothing in the office that we use as much as we do those telephones."

The gist of the matter lies in the convenience of the system. The man whose desk holds an intercommunicating telephone thinks nothing of using it to call his neighbor a few desks away. He might easily speak across the intervening space, but that would disturb the whole office. He might walk across with his message, but that would break the thread of his work, take time and create some disturbance as well. It is interesting to note that the man on a private exchange system is much more chary of his calls and will rarely use it where a personal call can conveniently be made.

The correspondent, in looking over the pile of letters on his desk, finds one which he must ask the shipping clerk about. Another must be referred to the foundry. A third requires engineering information. All this data he is able to collect in a few minutes with the aid of the telephone. If he has no telephone, he lays the doubtful letters aside while he proceeds with the others—thereby digging a pitfall for himself.

The object of system in an office or factory is to reduce to a minimum the number of unnecessary records, of superfluous operations, of false motions. In this it has no greater aid than the telephone. How many requisitions, letters and reports are obviated and the time required for their composition, writing and filing saved by the judicious use of the intercommunicating system.

Ordinarily every instrument on one of these systems can call every other instrument. Occasionally, however, this is not considered desirable and a limited call system is used. An interesting installation of this kind was recently made in the plant of the Schultz Piano Company, Chicago. This plant consists of four buildings, situated on four city blocks. Four streets must be crossed, a franchise for overhead wiring being obtained from the city and a cable hung from building to building. There are seventeen telephones on the system, all of which may be called from the office or the superintendent's room. Interdepartment connections are limited to those departments actually dependent upon each other for information.

The other extreme is seen in the system used by the Paepcke-Leicht Lumber Company, of Chicago, where twenty instruments, all interconnecting and in active use, are installed within a floor space about sixty feet square. It will be noted that a private exchange system operates alongside of the intercommunicating, each fulfilling its own function without interference.

The American School of Correspondence offers another example of parallel systems. With a perfectly satisfactory branch switchboard in operation, connecting all parts of the building with the city and long distance wires, an intercommunicating system has been installed which is said to have proven a wonderfully good investment.

An instance where a physical affliction has encouraged the use of the telephone is that of Mr. C. I. Hood, manager of the Hood's Sarsaparilla factory, who is troubled with deafness. Mr. Hood has learned to rely almost entirely upon the telephone, which, by a peculiar property, is perfectly audible to him, so that he prefers to conduct most of his affairs, and manages his factory, by its aid.

It is a common belief, born of the short distances involved, that the intercommunicating telephone is not subject to the severe tests that the city telephone is. As a matter of fact, very few outside telephones are used with the frequency and constancy that falls to the lot of the inside instrument. The employer communicates more often with his employees than with any one else, and as his appreciation of the factory telephone grows his use of it will become almost continuous.

The Chicago Electrical Show

By L. F. Cook

CHICAGO'S annual electrical show seems to possess a fascination for the layman that is surprising even to its promoters. From the first it has never failed to crowd the big Coliseum building to its capacity; and its fourth annual appearance, January 16 to 30, has upheld all previous records.

The decorative scheme of the show was changed this year by the use of Tungsten lamps, and by a wonderful starry sky effect, which appeared to increase the height of the Coliseum roof tremendously. This arrangement appealed to both the artistic sense and the optic nerves of the spectators as a great improvement.

Telephone exhibits were not greatly in evidence this year. Of course the concurrent holding of the independent convention last year brought a greater number of exhibiting telephone manufacturers to the show at that time. Such displays as there were, however, were excellent, and some apparatus of a novel character was exhibited. Particularly noteworthy was the showing of railway telephone material—a practical commentary upon the development of telephonic railway train dispatching.

Of the purely telephonic exhibits, that of the Stromberg-Carlson Telephone Manufacturing Company was particularly prominent. It included samples of the vari-

The Chicago Electrical Show for 1909.

ous types of magnets and central energy instruments for different kinds of service. Two interesting displays of the exhibit were mounted on panels at the back of the booth. One panel, wired and ready for operation, was devoted to a new line of central station intercommunicating telephone systems. The other panel displayed a complete equipment of the company's selective alarm railway telephone dispatching system, including dispatcher's office equipment and several local station

Stromberg-Carlson Telephone Manufacturing Company's Booth.

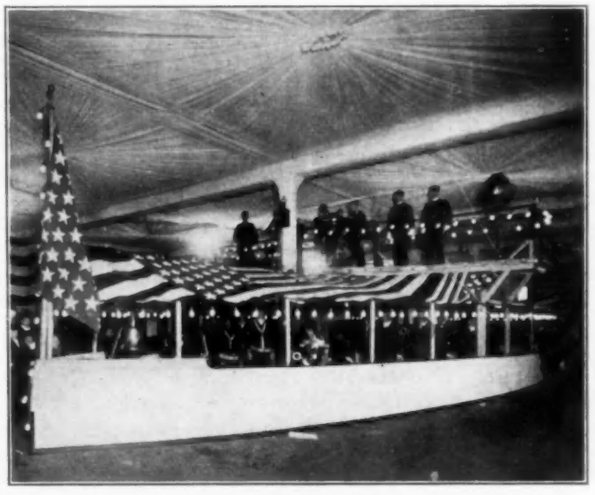
equipments with telephones and semaphore signals connected. This exhibit was shown in operation for demonstrating purposes. Two revolving display turrets in the booth conveniently displayed various types of telephones. One of these turrets showed generator call telephones; the other, central energy telephones. These are for rural telephone operation and for general office and house installations. The company also showed several types of magneto and common battery switchboards of the smaller types, including the self-restoring gravity drop magneto switchboard and a central energy private branch switchboard. All of these exhibits were wired and connected. The representatives of the company attending were H. C. Slemin, A. M. Haubrich and Lewis.

The Chicago Telephone Company installed its customary operating exhibit, which in this case was a working exhibit comprising two sections of what was said to be the largest multiple switchboard ever built. A chief operator, a supervisor and six operators were employed in the exhibit. A long distance booth demonstrated the uses of toll-line service. The exhibit was of great value in educating the public to the methods of an operating room.

The Kellogg Switchboard & Supply Company exhibited an outfit for dispatching trains on steam railroads. The system shown included the dispatchers' master set and four substation sets arranged in a working exhibit. By the use of this outfit it is claimed the dispatcher has full control of his wires at all times and can select any station on the line or ring any desired number of stations by one operation. The company also displayed a waiting room set demonstrating the value of installing a telephone in the waiting room of way-stations, enabling the trainman to communicate directly with the train dispatcher in the absence of the operator. The system was intended to show the superiority of the telephone over the telegraph for the operation of trains. The telephone apparatus shown is of the same type as has been ordered by many of the transcontinental railroads for adoption on their lines. A Jennings iron pole telephone set, designed to be placed on a pole at any desired point for the use of trainmen, and a trainmen's telephone, allowing conversation between trainmen inside of a car and the dispatcher, were also shown. When the latter instrument is used it is necessary to make connection to the main telephone wires by the aid of a specially devised apparatus which hooks over the main wires and forms a loop with the telephone set at the bottom end. Other exhibits were new railway wall and portable composite sets, designed for use on telegraph wires with the simultaneous dispatching of messages by telegraph; desk and wall intercommunicating sets; test sets and other equipment especially designed for railway service. Representatives in attendance at the booth were J. C. Kelsey, W. P. Booth, A. Wray and Pratt.

The Swedish-American Telephone Company exhibited samples of exchange telephones, switchboards, telephone tables and many of the parts used in the manufacture of its telephone apparatus. Among new apparatus shown was a desk telephone rigidly mounted on the top of a small mission table, with stool to match. The auxiliary apparatus is mounted on the under side of the hinged top of the table, readily accessible. When the stool is not in use it can be pushed underneath the table, where it is held clear of the floor by guides. Representatives of the company at the show were E. B. Overshiner, A. V. Overshiner and W. O. Rhode.

The American Telephone & Telegraph Company displayed a large map of the United States and Canada, showing the telephone lines operated by the company throughout both countries.



The United States Navy's Battleship Exhibit.

The Western Electric Company showed several styles of intercommunicating telephones for interior systems and isolated plants and a number of special telephone sets, including railway composite sets, linemen's test sets, United States Navy battleship telephones and iron box telephone station, as furnished for the city of New York's high pressure fire service telephone system, and the United States Life Saving Service. Telephone systems for railway train dispatching were also displayed, includ-

ing Gill and Wray and Cummings selectors and station machines, train dispatcher's telephone sets and instruments for station agents and tower men. The company was represented by C. H. Starkweather, Jr., W. H. Tompkins, J. H. Finley and C. L. Howk.

The Collins Wireless Telephone Company had an interesting display of apparatus, showing three types of wireless telephone instruments for different transmission distances; also a complete wireless telephone system for talking both ways at the same time. The principal feature was a revolving carbon arc lamp, with two blow-out magnets to maintain the arc in the center of the carbons. This permits more current than with the ordinary arc lamp and gives a more powerful system. In practice on long-distance work as high as 5,000 volts are used at the lamp and for medium distances 220 volts. In this system the sender tunes to the receiver by means of variable inductance and capacity. The resonance tube used in this connection is a long glass vacuum tube with platinum electrodes. During the show high-frequency experiments, showing the transmission of energy from the aerial were given. A. Frederick Collins was in attendance.

The American Electric Fuse Company displayed a full line of lightning arresters, both switchboard and aerial types, as well as its self-cleaning arrester. A sample line of telephone protective apparatus and distributing frames for small exchanges were also shown. American black enamel wire, wire splices, motor starters and controllers, and a new ignition device for gasoline engines, formed other features of the exhibit. Frank G. Jones, G. W. Rodomer, George Padley and R. C. Da Costa were in attendance.

The American Steel and Wire Company exhibited samples of all its electrical products, wire and cable, a very complete line being displayed by means of sample boards. B. H. Rizer and C. R. Sturdevant were in attendance.

The Commercial Appliance Company displayed the "Germless" glass telephone transmitter mouthpiece as a feature, as well as a convenient form of telephone bracket. The company was represented by W. M. Wood, G. W. Conover and H. S. Conover.

The Electric Storage Battery Company showed its chloride accumulators in lead-lined and glass tanks. Special types for railway signal and telegraph work were also shown, as well as batteries for car lighting and ignition purposes. An interesting photograph was displayed of a recent 10,000 ampere battery installation. G. H. Atkin, J. M. S. Waring and H. B. Marshall were among the company's representatives at the booth.

A. & J. M. Anderson showed sample boards of Anderson line construction materials, as well as knife switches, time switches, plugs and receptacles. William W. Hincher was in charge.

The General Electric Company exhibited its mercury arc rectifiers for charging storage batteries and other purposes. A very comprehensive display of the company's varied product was arranged in an interesting manner. F. H. Gale, W. H. Colman and E. L. Callahan were among the company's representatives at the exhibit.

The Kirkpatrick Conduit Company showed samples of single and multiple duct clay conduit for underground installation work. E. F. Kirkpatrick was in charge of the exhibit.

The McRoy Clay Works showed a line of its salt glazed vitrified clay conduits, single and multiple duct. A special 2½ inch duct, made on a Pacific coast order, was a feature.

Mathias Klein & Sons exhibited line construction and maintenance tools, the latter comprising a full line of climbers, splicing clamps, pliers, etc.

The Manhattan Electrical Supply Company, besides its line of dry batteries, displayed heating devices, spark coils and vibrators.

The Mears Ear Phone Company displayed and demonstrated its Aurophone, a telephonic device for the use of those afflicted with deafness.

The H. W. Johns-Manville Company exhibited "Noark" enclosed fuses, fuse boxes, line construction material and insulation, friction tape, guy anchors and fittings for railway, lighting and telephone work.

The Appleton Electric Company exhibited cabinets which displayed "Umlets" for rigid and flexible conduit work. Outlet receptacles and switches, fuses, connectors and telephone protective devices were also shown.

The Central Electric Company showed samples of Okonite wire, D. & W. fuses, and a complete line of the specialties handled by the company.

The Chicago Fuse Wire Manufacturing Company exhibited its fuse wire, links and strips, cutouts and enclosed fuses. The company's sherardized outlet boxes and covers, treater by a new galvanizing process.

The Electric Appliance Company showed C. & S. intercommunicating telephones, Paranite wires and cables, Faraday bells, and samples of the other specialties it handles.

The Electrical Testing Laboratories made demonstrating tests of high tension insulators, and showed a checking table for testing electrical measuring instruments.

The Red Cross Antiseptic Company exhibited and demonstrated the Red Cross antiseptic telephone mouthpiece, which consists of a perforated and chemically charged aluminum lining to a vulcanite mouthpiece.

The Stolz Electrophone Company displayed its sensitive portable telephone for the use of deaf people, as well as the opera and church electrophones and the stenographone.

Roth Bros. showed a full line of direct current motors and telephone charging and ringing machines.

The Wagner Electric Manufacturing Company exhibited a new model single phase alternating current motor, as well as late types of polyphase motors and telephone charging and ringing machines. Alternating and direct current measuring instruments formed a feature of the exhibit.

Henry Newgard & Company showed the Newgard waterproof receptacle under the test of running water. Panel boards and steel cut-out boxes were also exhibited. The company had charge of wiring the Coliseum for the show.

The National Carbon Company showed carbon electrodes for telephone work, carbon brushes, arc carbons and carbon specialties for telephone apparatus.

The Murphy Electric Rectifier Company exhibited its new mechanical rectifier for charging batteries, telephone work, and other applications demanding direct current.

The National Battery Company showed grids, plates, etc., used in its storage batteries for telephone and other work.

The Mechanical & Electrical Manufacturing Company showed a line of electrical porcelain goods, including receptacles, sockets, outlet box covers, etc.

The Western Insulation Company displayed a line of mica insulations, of the Chicago Mica Company and of Watson Brothers, insulating cloths, tapes, papers, etc.,

of the Irvington Varnish and Insulation Company, and fibro products of the Wilmington Fiber Specialty Company.

The Westinghouse Electric & Manufacturing Company displayed various types of motors, including a small fan for telephone booths, battery charging outfits, heating devices, transformers, lamps, etc.

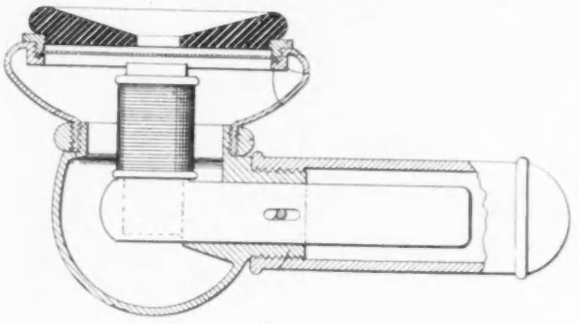
The United States Navy exhibit occupied the whole of the Coliseum annex. A complete working wireless telegraph exhibit was installed on the mimic battleship, and wiring diagrams were shown of all the principal electrical installations used on the United States battleship Connecticut, as well as literature and diagrams of the Shumaker, Telefunken, De Forrest, Mossie, Fessenden, Stone and Pickard wireless systems; also diagrams of navy standard switch and distribution boards for all purposes. The exhibit was in charge of Chief Gunner Andrew Olsson, United States Navy.

Recent Telephone Patents

By David S. Hulfish

It will be the purpose of this department to list all United States patents, as they are issued, which pertain to any branch of the telephone business, giving such data in each case as will enable the reader to judge whether he wishes to see the complete drawings and specifications of the patent. When patents of special interest to TELEPHONE ENGINEER readers are encountered, the descriptive matter herein will be amplified accordingly. A complete copy of drawings, specifications and claims of any patent listed will be furnished from this office upon receipt of ten cents.

907,224. Telephone System. A common battery multiple system in which each line has a relay and a repeating coil permanently associated with the line and with the main battery. The relay of the line is under control of the substation at all times, and controls the supervisory relay of the cord pair in turn. W. W. Dean, Chicago, Ill., assignor to Kellogg Switchboard & Supply Company, of same place.

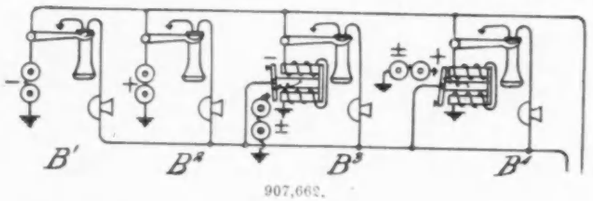


908,846.

907,230. Coin Collector. An audible-signal coin collector of the lever-actuated type. Philadelphia was early a user of the audible-signal pay station, and this type of collector has developed there. F. R. Graeber, C. T. Entrikin and G. W. Garman, Philadelphia, Pa.

907,251. Insulator Knob. A separable insulator knob designed to hold a wire between its two parts. Harry W. Lawrence, Denver, Colo.

907,320. Transmitter Mouthpiece. A mouthpiece or funnel to receive the speaker's mouth is connected by two sets of "non-resonant" tubes with the transmitter case containing the diaphragm and resistance element. Between the two sets of tubes is an "expansion chamber." Arthur Dare, Philadelphia, Pa.



907,662.

907,383. Telegraphone Record. The record is reduced to disk-like form, similar to a Graphophone disk. John A. Lieb, New York, N. Y., assignor to American Telegraphone Company.

907,470. Telephone System. In present practice, when speech currents from a high-resistance transmitter are sent out upon a telephone line on which a number of receivers are off the hook, and on which some stations are near and some far away, the nearer stations will take a slightly greater share of the speech currents, and thus handicap the distant stations. To equalize this, Mr. Currier provides an adjustable retardation or an adjustable condenser is placed at each telephone. The system is suitable for train dispatching systems in which the dispatcher desires to speak to all stations at once. Hiram D. Currier, Chicago, Ill.

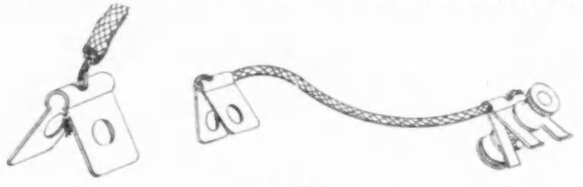
907,482. Signal. A semaphore arm is mounted upon an automatic selector or connector switch, the arm swinging into a position where it is visible when the automatic switch is "off-normal." Heretofore an "off-normal" lamp has been the customary signal. John Erickson, Chicago, Ill., assignor to First Trust & Savings Bank, of same place, trustee.

907,542 and 907,543. Ground Clamp. A band is adopted to surround a water pipe and a bolt is provided to draw the band taut and to clamp a conductor. John C. Vogel, Philadelphia, Pa., assignor to Fairmount Electrical and Manufacturing Company, of same place.

907,581. Telephone System. A novel arrangement of line and supervisory relays. Alfred H. Dyson, Chicago, Ill., assignor to Milo G. Kellogg, of same place.

907,582. Telephone System. A system of automatic switches of the Strowger type with central battery talking and signaling circuits, and a differential repeating relay for disconnection. A. H. Dyson and F. W. Dunbar, Chicago, Ill.

907,658 and 907,659. Telephone System. A supervisory relay having a three-position armature is used, the armature contacts being arranged to close the lamp circuit when the armature is in its middle position. A dummy high resistance is placed across the conductors of a connected line to draw the supervisory armature into its middle position, and the substation bridge is assumed to increase the current through the supervisory relay so as to draw that relay's armature into its extreme attracted position, thus extinguishing the supervisory lamp. H. G. Webster, Chicago, Ill., assignor to Milo G. Kellogg, of same place.



908,389.

907,660. Telephone System. A common battery system having a differential line relay. H. G. Webster, Chicago, Ill., assignor to Milo G. Kellogg, of same place.

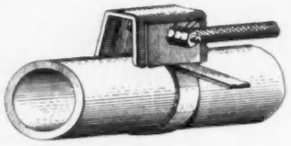
907,661. Telephone System. The heat coil of the line is connected in series with the line relay, and is not left in the talking conductors of a connection, as is usual. A novel arrangement of marginal supervisory relays also is shown. H. G. Webster, Chicago, Ill., assignor to Milo G. Kellogg, of same place.

907,662. Selective Signaling System. An arrangement of biased telephone ringers and substation relays for a four-party line. H. G. Webster, Chicago, Ill., assignor to Milo G. Kellogg, of same place.

907,724. Conduits. Means for passing a liquid through a conduit at high pressure, for the purpose of driving the liquid into the walls of the conduit and rendering it impervious. James M. Boyle, New York, N. Y., assignor to Monolithic Duct Company, of same place.

907,751. Busy Test System for Telephone Switchboards. W. W. Dean, Chicago, Ill., assignor to Kellogg Switchboard & Supply Company, of same place.

907,788. Insulator Clip. A substitute for a tie wire. Alphonso R. Hall, Leonardsville, N. Y., assignor of one-half to Lynn C. Maxson, West Edmeston, N. Y.



907,543.

907,804. Toll Telephone System. This is a system for local measured service in which the subscriber is obliged to deposit a coin to call the operator, the coin being obtainable by him at any time before the called line answers, and then being locked in the coin collector automatically. David S. Hulfish, Chicago, Ill., assignor to Baird Manufacturing Company, of same place.

907,834. Insulator. This is a spike with a clip carrying an insulator through which the wire may pass. The spike has a convenient driving head. George B. Marshall, Shannon, Texas.

907,960. Phonograph Attachment. An arrangement of parts is shown whereby a ringing current upon a line will connect a transmitter and phonograph to the line and cause the delivery to the line of a waiting message, restoring the parts for a repetition of the message upon succeeding calls. Gerrit J. Boelen, The Hague, Netherlands.

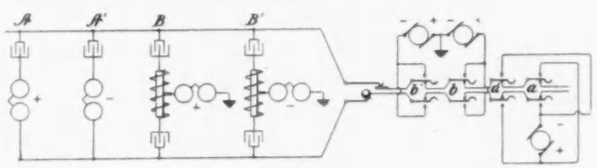
907,975. Transmitter. The carbon cell is pressed against the diaphragm and moves with the diaphragm. W. W. Dean, Elyria, Ohio, assignor to Dean Electric Company, of same place.

908,980. Insulator. An insulator of two parts, clamping the wire between them, and provided with a threaded stud for attachment to a crossarm or other support. James C. Gibson, Owensboro, Ky., assignor of one-half to A. H. Smith, of same place.

908,213. Telephone System. Electrolytic cells are substituted for condensers at selective signaling substations, where the condensers would interfere with the signaling currents. W. W. Dean, Chicago, Ill., assignor to Kellogg Switchboard & Supply Company, of same place.

908,375 and 908,376. Call Register. This is a register of the type in which the accumulated registered calls may be transmitted to the central office, thereby enabling the substation meter reading to be taken at the central office. Edward P. Baird, Evanston, Ill., assignor to Baird Manufacturing Company, Chicago, Ill.

908,389. Connector. A short flexible conductor for connecting battery cells is shown provided with spring clips of novel design for engaging the binding posts of the cells. William H. Briggs, Richmond Hill, N. Y.



908,698.

908,444. Telephone Hood. The object is to provide a simple and practical device which may be applied readily to a chair, wall, or other support so that it may be lowered over the head of the person using the telephone to exclude extraneous noises and enable a conversation to be carried on in a noisy room or shop. The telephone apparatus is arranged within the hood, and the switch which usually is controlled by the telephone hook lever is controlled by the movement of the hood instead. Harry L. Burrhus, Hornell, N. Y.

908,490. Attachment. A broad pressed metal writing shelf with paper clip and pencil groove, adapted to attach to a wall type telephone set. N. B. Parsons and A. Beutler, Chicago, Ill., assignors to Belden Manufacturing Company, of same place.

908,551. Transmitter. Compound electrodes in the carbon button have projecting walls of insulating material which control the path of the current through the comminuted material. Claude D. Enochs, La Crosse, Wis.

908,698. Signaling System. A system for a four-party line, ringing two biased bells from limb to limb of the line, and two biased bells from the middle of an inductive bridge to earth. It is noted that condensers are included in the circuits in series with the biased bells. Sylvanus A. Reed, New York, N. Y.

908,846. Receiver. The diaphragm is clamped under stress, and various adjustments for the different parts are provided. Jesse T. Curtis, Bement, Ill.

908,926. Telephone System. A common battery switchboard system in which the battery bridge of a connected line is formed on one side of the battery by the line relay and on the other side by the supervisory relay. C. S. Winston, Chicago, Ill., assignor to Kellogg Switchboard & Supply Company, of same place.

909,356. Transmitter Attachment. An arrangement by which the transmitter diaphragm may be damped to permit conversation near a transmitter without permitting the distant party to the connection to overhear. J. S. Wincrantz, Pittsburg, Pa.

909,382 and 909,383. Automatic Call Device. Means is provided in connection with the usual Strowger calling dial to prevent its return being forced in speed. John Erickson, Chicago, Ill., assignor to First Trust and Savings Bank, of same place, trustee.

907,834.

909,403. Switching Device. A simplification of step-by-step mechanism for lock-out party-line stations. William Hagstrom, Lindsborg, Kan., assignor of parts to John Anderson and C. A. Anderson, of Salina, Kan.

909,481. Connector. A spring clip for terminal for electric conductors. Two parallel loops of wire tend to pull apart in their parallel planes. William C. Tregoning, Hackensack, N. J., assignor to Tregoning Electric Manufacturing Company, Cleveland, Ohio.

909,566. Transmitter. The large flexible diaphragm is dispensed with and replaced by a smaller diaphragm attached at its center to the carbon cell and not attached at its edge, the entire diaphragm being a freely vibrating sound plate. Joseph B. Edwards, Chicago, Ill., assignor to Kellogg Switchboard & Supply Company, of same place.

909,702. Transmitter. A granular carbon transmitter having multiple cells and structurally stiffened parts. S. A. & R. L. Steinbarger, Augusta, Ill.

No Free Telephone Service for City

The Wisconsin railroad commission was fully sustained in a decision rendered by Judge E. R. Stevens, of the circuit court for Dane county, in the case of the City of Superior against the railroad commission and the Douglas County Telephone Company, involving the validity of an arrangement entered into by the city for free telephone service in the city offices. The decision of the railroad commission was to the effect that this free service arrangement was in violation of law and void.

Of Interest to the Trade

A Quick Switchboard Installation

An example of rapid telephone switchboard installation was given by the Western Electric Company at Franklin, Pa., recently. A fire broke out in the building in which the exchange was located early in the morning of November 17 and in a few hours the city was without any convenient means of communication.

Before the fire had burned itself out an order was wired the Pittsburg house of the Western Electric Company to furnish as soon as possible the means by which Franklin might again have telephone service.

A number of emergency boards, which Western Electric houses always have on hand, were set up in the city in about forty-eight hours after the fire, which supplied the needs of subscribers until a new switchboard was put in service.

Renewing a telephone service in a little over forty-eight hours after a main exchange has been totally destroyed is quick work, particularly when the emergency

Western Electric Company's New Installation at Franklin, Pennsylvania.

boards have to be sent about 150 miles. But what is most remarkable is the fact that on the evening of the day the emergency boards were received from Pittsburg a car of switchboard material was received from the Western Electric manufacturing plant at Hawthorne, Illinois.

The *Franklin Evening News*, in praising the manner in which the work was performed, has the following:

> Upon the receipt of the order for a new switchboard by the Pittsburg house, specifications were immediately wired to its manufacturing plant at Hawthorne, Ill., just outside Chicago. With speed characteristic of the manner in which they do things at that factory, an express car of switchboard material was ready for delivery here by midnight of the day on which the branch boards were received from Pittsburg.
>
> On the following morning experts in the employ of the electrical company which had the work in hand were installing the material received the previous night. The rapidity with which they worked can be appreciated when it is known that on Sunday, the 29th, twelve days after the fire, the installation of the new switchboard was completed, and subscribers were being given a service which, if anything, is superior to that given while the old switchboard was in operation.

M. H. Buehler, general manager of the Central District Printing and Telegraph Company, expresses his appreciation of the speedy and efficient work in a letter to President H. B. Thayer of the Western Electric Company, which reads in part as follows:

"I beg to thank you for the very prompt and efficient aid rendered us in restoring service to our Franklin, Pa., subscribers, the credit of which is due largely to your efforts, and the prompt manner in which you looked after our needs."

The *News* draws an analogy between the quick work performed on the new Franklin switchboard and the record recently made by the Western Electric Company in installing an immense switchboard in Paris, France, in 60 days, one of the most extraordinary industrial achievements of modern times. The remarkable features of the Paris installation were fully treated in the January number of TELEPHONE ENGINEER.

Recent Kellogg Installations

The twin switchboard installations which are described in the article, "Two Model Central Energy Exchanges," which appears on another page, are examples of the efficient equipment furnished by the Kellogg Switchboard Supply Company, Chicago. An attractive little booklet, the front cover illustrating the factory and cut to the shape of the building, containing numerous views and descriptive matter of recent switchboard installations, has recently been issued by the company. The halftones show interior views of exchanges, front and rear illustrations of switchboards, distributing frames, relay racks, power equipment, etc. These exchanges are of the latest type.

The company's bulletin No. 40, describing a new pole changer, has recently been issued. It is well illustrated with different views of the apparatus, and descriptive matter that states what the pole changer will do and its efficiency.

Anyone contemplating the purchase of such an instrument will be interested in this bulletin, and the company's engineering department will give any further information needed. Those interested in construction and line material, etc., should send for the company's revised price list recently issued, which is complete, covering this entire line; and bulletin No. 17, description of line material and supplies. When writing, mention TELEPHONE ENGINEER.

A New Harvard Catalogue

The Harvard Electric Company has issued a new catalogue known as No. 17, which is descriptive of a part of the many electrical specialties made by the company. This catalogue is the forerunner of a complete new series of printed matter illustrating "Harvard dependable electrical necessities."

The No. 17 catalogue describes Harvard patent steel brackets, Harvard welding wire joints, the improved Harvard electrical switch boxes, etc.

The company reports that its new galvanized channel steel bracket is meeting with deserved success since it was placed on the market a few months ago. The firm sent out a number of brackets on approval and has received orders and testimonials relative to its serviceable qualities.

In the Operating Field

PERSONAL NOTES.

Milo G. Kellogg, who has been quite ill at his home, is recovering rapidly.

Kempster B. Miller recently underwent a very successful operation for appendicitis, and is now trying for the quick recovery record.

Sergius P. Grace and Bernard C. Groh of Pittsburg were visitors at the offices of Telephone Engineer recently.

John P. Cracraft, president and general manager of the Cracraft-Leich Electric Company, Genoa, Ill., called recently at the offices of Telephone Engineer.

E. B. Stow has been appointed manager of the Home Telephone Company of Papillon, Neb.

James T. Ward has been appointed secretary-manager of the Mills County Telephone Company, Malvern, Ia.

M. E. Richael, Maquoketa, Ia., has been appointed manager of the Jones County Telephone Company, Monticello, Ia.

J. Morgan Bigelow, formerly of Springfield, Mo., has been appointed manager of the Home Telephone Company at Long Beach, Cal.

James P. Gibbs, Ithaca, Mich., has been elected general manager of the Valley Home Telephone Company recently organized at Saginaw.

E. H. Reeves, Columbus, Miss., has been appointed manager of the Cumberland Telephone and Telegraph Company's exchange at Jackson, Miss.

Henry A. Barnhart, Rochester, Ind., recently elected to Congress from the Thirteenth district, is president of the Rochester Telephone Company.

W. H. Liggett has been chosen president of the Farmers' Mutual Telephone Company, Herrington, Kans., to succeed E. E. Rathborn, resigned.

J. Boyd, formerly of Smithville, Tex., has been appointed manager of the Southwestern Telegraph and Telephone Company's exchange at Flatonia, Tex.

Andrew Warner, president and manager of the Chardon Telephone Company, died at his home in Chardon, Ia., December 30, 1908, after a brief illness.

E. B. Walton has been transferred from Key West, Fla., to the management of the Southern Bell Telephone and Telegraph Company's exchange Atlanta, Ga.

W. C. Bruce, formerly manager of the Southern Bell Telephone and Telegraph Company's exchange at Pensacola, has been appointed to the management of the company's exchange at Montgomery, Ala.

John C. Hay, formerly in charge of the Cumberland Telephone and Telegraph Company's exchange at Hattiesburg, Miss., has been transferred to the management of the company's exchange at Vicksburg.

L. A. Dolan, formerly with the Providence Telephone Company, also with the engineering department of the American Telephone and Telegraph Company, has been elected president of the Telephone Society of Nova Scotia.

Peter Lynch, recently general manager of the Philippine Islands Telephone Company with headquarters at Manila, has been placed in charge of the division of the Pacific States Telephone & Telegraph Company at Seattle.

J. Clark Morgan, for the past ten years local manager of the Bell Telephone Company at Grafton, W. Va., has been promoted to the position of general manager of the West Virginia Eastern Telephone Company with headquarters at Elkins.

Fred Chambers, the wireless operator who displayed such courage in the rescuing of passengers on the ship Finance, which sank near New York harbor last Thanksgiving Day, is a son of James A. Chambers, manager of the Southwestern Telegraph and Telephone Company at Galveston, Texas.

NEW TELEPHONE COMPANIES.

Pell City, Ala.—The St. Clair Telephone Company has been incorporated by L. Cooke, J. F. Cooke, E. E. Cooke and others, with a capital stock of $10,000.

Grover, Colo.—The Grover Telephone Company has been organized with the following officers: President, E. E. Lewis; secretary-treasurer, G. E. Morris; directors, A. B. Milton, D. M. Hawley, George W. Parker.

Telluride, Colo.—The Naturita Telephone Company has been incorporated with a capital stock of $50,000, by G. A. Akers, H. H. Ross, George M. Hook and Arthur Priestly.

Sullivan, Ind.—Articles of incorporation have been filed for the Paxton Telephone Company, with a capital stock of $500, by Jacob Cox, John M. Cammon and John Nesbit.

Thompson, Ia.—The Thompson Telephone Company has been organized by a company of business men to take over the local telephone system.

Parsons, Kans.—A new rural telephone company has been organized with officers as follows: President, J. E. Pefley; vice-president, J. C. Benard; secretary, L. J. Bicknell; treasurer, A. A. Johnston.

Barryton, Mich.—The Barryton Rural Telephone Company has been incorporated with a capital stock of $10,000. The directors are Henry Walroth, D. Wait and Charles Gawner.

Lansing, Mich.—Articles of incorporation have been filed for the Smyrna Telephone Company, with a capital stock of $3,000. The directors are Guy Purdy, Charles H. Mead, George B. Frost and Carl N. Northrop.

Riga, Mich.—The Riga Farmers' Telephone Company has been incorporated with a capital stock of $3,000.

Amity, Ark.—The Cedar Point and Amity Telephone Company has been organized by J. F. Sheets, A. L. Hawkins, T. A. Hawkins, S. R. Harrison and M. L. C. Small.

Rupert, Ida.—The Settlers' Mutual Telephone Company has been incorporated with a capital stock of $48,000 by L. R. Adams, R. W. Adams and Charles C. Nelson.

Guttenburg, Ia.—The West Union Rural Telephone Company has been organized. The directors are J. Shay, McGregor; T. Morrison, Decorah; C. Curtz, McGregor.

Wilton Junction, Ia.—The Moscow-Wilton Rural Telephone Company has been incorporated with a capital stock of $500.

Science, Ky.—Articles of incorporation have been filed for the Science Hill Telephone and Exchange Company by William Lowery, T. W. Denney, A. Y. Hayes and others; capital stock, $800.

Browerville, Minn.—The Ward and Moran Telephone Company has been organized with E. T. Crist as president and Frank Haverick secretary. It is the purpose of the company to construct a line to Long Prairie.

Olga, Minn.—The Olga Telephone Company, with headquarters at Fosston, has been incorporated with a capital stock of $10,000.

Vermillion, Ill.—The Vermillion Grove Telephone Company has been incorporated with a capital stock of $5,000. The incorporators are John M. Kendall, C. M. Hester and D. J. Pugh.

West Plains, Mo.—The Globe Telephone Company has been organized with the following officers: President, John G. W. Richardson; secretary, Asa Jarrett.

Polk, O.—The Polk Rural Telephone Company has been incorporated by J. F. Smith, J. S. Kauffman and others, with a capital stock of $8,000.

Woden, Ia.—The Woden Farmers' Telephone Company has been incorporated with a capital stock of $2,000.

Merryville, La.—The Merryville Telephone Company has been incorporated with a capital stock of $10,000. The officers are: President, Dr. J. H. Knight; vice-president, B. H. Carroll; secretary-treasurer, R. E. Welbern.

Long Lake, Minn.—The Long Lake Rural Telephone Company has been organized with the following officers: President, George Sinclair; vice-president, Gust Carlson; secretary, Gust Sandgren; treasurer, Andrew Olson.

Bible Grove, Mo.—A telephone company has been organized with officers as follows: President, Robert Burrus; secretary, J. T. Salisbury; treasurer, A. N. Barb.

Beach, N. D.—The Golden Valley Telephone Company has been incorporated with a capital stock of $10,000 by J. P. Smith, Sentinel Butte; G. D. Lovell, Edward Hoverson and others, of this place.

Oakwood, Okla.—The Oakwood Mutual Telephone System has been incorporated by Thomas Conklin, Joseph Hewett, Charles Heaton and others. Capital stock, $600.

Portland, Ore.—Articles of incorporation have been filed for the Columbia Telephone Company of Oregon, by T. L. Evans, W. C. Hicks and Fred C. Reed; capital stock $1,200.

Blacktown, Pa.—The Blacktown Telephone Company has been incorporated with a capital stock of $10,000.

Princetown, Pa.—The Princetown Rural Telephone Company has been organized with the following officers: President, S. J. Hill; secretary, D. H. Manwiller; treasurer, G. Web Brown.

Riley, Ind.—The Farmers' Independent Telephone Company has been incorporated with a capital stock of $1,000 for the purpose of operating a telephone system in Clay and Vigo counties. The incorporators are: Hartley Brell, William Clingman, Everett Fox and others.

St. Francis, Kans.—The St. Francis Telephone Company has been incorporated by Joshua Crosby, E. L. Dobbs and others, with a capital stock of $20,000.

Grayson, Ky.—The Mutual Telephone Company has been organized by A. L. Moore, C. D. Moore and R. M. Cannon, with a capital stock of $600.

Paintsville, Ky.—The Johnson County Telephone Company has been incorporated by B. K. Given, D. J. Wheeler and others, with a capital stock of $2,000.

Tuscarora, N. Y.—The Tuscarora Telephone Company has been organized by J. W. Slaight, T. J. Carbrey, J. H. Roner, J. C. Deventer and others.

Braman, Okla., R. F. D. No. 3.—The Sumter Telephone Company has been organized with a capital stock of $12,000. The directors are: Frank Wells, A. W. Newcomb, C. E. Algier, William Riley and B. E. Esterly.

Comanche, Okla.—The Washita Rural Telephone Company has been organized. The capital stock is $5,000 and the directors are: W. G. Brymer, J. M. Bryer, Comanche; O. W. Brymer, Duncan; M. E. Harris, McKinney, Tex.

Elgin, Okla.—A rural telephone company has been organized here with a capital stock of $3,000. The directors are: E. A. Bell, I. A. Fisher and H. E. Cline.

Dexter, Minn.—Articles of incorporation have been filed for the Dexter Telephone Company; capital stock $10,000.

Plattsburg, Miss.—The Plattsburg Telephone Company has been incorporated with a capital stock of $5,000, by J. L. Yardborough, J. C. Hobby and others.

Butler, Mo.—The Butler, Peru and Pleasant Gap Telephone Company has been incorporated with a capital stock of $5,000. The directors are J. L. Bartlett, N. Blogh, U. S. Isom and R. R. Eason.

Lebanon, Mo.—The Laclede County Telephone Company has been incorporated with a capital stock of $10,000. The incorporators are J. E. Dickens, B. C. Hooper, Thomas Gilmer, Martin D. Johnson and others.

Butte, Mont.—Articles of incorporation have been filed for the Independent Messenger and Telephone Company of Butte, with a capital stock of $10,000. F. W. Graff and others are the incorporators.

Ainsley, Neb.—The Box Elder Telephone Company has been incorporated by E. B. Wait, H. Springman and others; capital stock $25,000.

Buffalo, N. Y.—The Federal Telephone and Telegraph Company, with principal offices in this city, has filed articles of incorporation with a capital stock of $6,000,000. The directors of the company are: B. G. Hubbell, W. H. Andrews, C. C. Machemer, R. W. Chapin, G. A. Plimton, H. H. Lyttell, R. R. Hefferd, Andrew Langdon, T. B. Lockwood, C. W. Goodyear, A. D. Bissell, C. L. Ingham, W. P. Cooke, Buffalo; and G. D. Morgan, Rochester.

Northwood, N. D.—The Avon Pleasant View Telephone Company has been incorporated with a capital stock of $95,000. The incorporators are: T. O. Mandt, E. Corkins, John Pietron and others.

Postville, Sask., Can.—J. A. Maharg, N. E. Harris, J. A. Sheppard, Hugh Yake, Arthur Kathwell and S. K. Hathwell have organized a rural telephone company.

CHICAGO, ILL.—The Railway Telephone and Electric Company has been incorporated with a capital stock of $30,000 for the general manufacture and sales of electrical appliances. The incorporators are: Max W. Zabel, A. Miller Belfield, O. M. Wermich.

WINNFIELD, LA.—The Southern Telephone Company formed by the consolidation of the North Louisiana and Southwestern Telephone companies, has been chartered with a capital stock of $500,000. The officers of the company are: President, A. B. Banks; first vice-president, W. A. Longine; second vice-president, J. M. Middleton; secretary, H. C. Couch; treasurer, J. W. Lee; directors, the above officers and C. C. Conroy, William M. Wepfer, R. Colbert and O. W. Grisham.

BOSTON, MASS.—The Onaway Telephone Company has been incorporated with a capital stock of $50,000 by Arthur B. Grover, Winchester, and others.

ROCHESTER, N. Y.—The Telephone Specialty Company has been incorporated with a capital stock of $10,000, by B. B. Clark, Robert M. Parks, John J. McInerney, Rochester. It is the purpose of the company to manufacture telephones and telephone apparatus.

JUNIATA, PA.—People of Homer's Gap have organized a local telephone company with the following officers: President, John Smith; vice-president, George Moyer; secretary, Charles R. Foutz; treasurer and agent, Ben Mathers.

CINCINNATI, OHIO.—Articles of incorporation have been filed for the Davis Telephone Company of Whitley county by A. B. Johnson, M. A. Maurey, W. B. Davis and others; capital stock $1,000.

ARTHUR, OHIO.—The Arthur Mutual Telephone Company has been incorporated by Claude Morris and others.

HOPEDALE, OHIO.—The Hopedale Telephone Company has been incorporated with a capital stock of $5,000, by W. V. Scott, J. K. Skeely, J. B. Beadle and others.

PAWNEE, OKLA.—The Coal Creek Telephone Company has been incorporated with a capital stock of $300. The incorporators are: W. J. Nail, John Wolfe and J. M. McKill.

PRYOR CREEK, OKLA.—A rural telephone company has been organized here. The officers are: President, C. L. Samuel; vice-president, O. H. Graves; secretary and treasurer, J. O. Robinson.

SCHAEFFERSTOWN, PA.—The Schaefferstown Rural Telephone Company has been organized with a capital stock of $5,000. The officers are: President, F. B. Horst, Reistville; vice-president, J. T. Gable, Horst Mill; secretary, Alvin Schaeffer, Schaefferstown; treasurer, S. H. Bomberger, Schaefferstown.

DALLAS, S. D.—Articles of incorporation have been filed for the Tripp-Myer Telephone Company, with a capital stock of $10,000.

GOLDENDALE, WASH.—The Farmers' Union Telephone Company has been organized here.

BAKER, WASH.—The Skagit River Telephone and Telegraph Company has been incorporated by J. C. Eden and R. J. Kellog, with a capital stock of $10,000.

HARPER, OKLA.—The Harper County Mutual Telephone Company has been organized here. The directors are: O. S. Carpenter, W. H. Richardson and John Etherton.

GRANT'S PASS, ORE.—The Citizen's Telephone Company has been organized by A. E. Marsh, H. D. Norton and Arthur Conklin.

HARRISBURG, PA.—Articles of incorporation have been filed for the Ligonier Valley Telephone Company, with a capital stock of $5,000. The directors are Frank Phillippi, J. G. Weaver, J. O. Stough, Jno. A. Brant, Isaac Kempt and Reuben McKiveen.

BLUE RIDGE SUMMIT, PA.—The Blue Mountain Telephone Company has been incorporated with a capital stock of $5,000. George T. Oliver, Blue Ridge Summit, is one of the promoters.

MT. VERNON, PA.—J. P. Aikens, Amos Strode, G. Howard Pearson and others will make application for a charter for the Juniata Telephone Company.

LEXINGTON, S. C.—A telephone company has been organized at this place with the following officers: President, Haskell Schull; vice-president, Marshall Hook; secretary, W. K. Hook; treasurer, G. A. Kaminer.

SPRING CREEK, TENN.—The Log Cabin Telephone Company has been organized with H. O. Utley, secretary-treasurer, and G. W. Fly, manager.

WAUTOMA, WIS.—The White River Farmers' Telephone Company has been incorporated with a capital stock of $1,500 by Julius Groskreutz, William Boehlke, W. F. Wandrey and others.

ST. JOSEPH, WIS.—The Moulton Rural Telephone Company has been organized by C. N. Steindorff, J. E. Frawley and E. B. Nehder, with a capital stock of $3,000.

PAWNEE, OKLA.—The Coal Creek Telephone Company has been incorporated with a capital stock of $300 by W. J. Nail and J. M. McKill of Ralsten, and John Wolfe of Pawnee.

HALFWAY, ORE.—The Panhandle Co-operative Telephone Company has been incorporated with a capital stock of $4,500. Charles B. Davis is president.

PENDLETON, ORE.—A telephone company has been organized by J. Hanscom, Hugh Bell and others.

SHEFFIELD, PA.—The Sheffield Telephone Company has been incorporated with a capital stock of $15,000 by Archibald S. Day. The directors are: Wm. A. Alexander, Walter W. Beaty, Warren, Pa.; Frank D. Kinnear, Youngsville, Pa.

LEXINGTON, S. C.—A telephone company has been organized by the farmers of the Rockywell section with the following officers: President, Haskell Shull; vice-president, Marshall Hook; secretary, W. K. Hook; treasurer, G. A. Kaminer.

HAYTI, S. D.—Articles of incorporation have been filed for the Hamlin County Farmers' Telephone Company; capital stock, $25,000. The incorporators are Warren Greene, A. H. Anderson, K. G. Knudtson, Edward Arsberger and P. O. Svarari.

VOLIN, S. D.—The Volin Telephone Company has been incorporated with a capital stock of $25,000; incorporators, Iver Bagstad, A. O. Bagstad, Ole Peterson, Edw. O. Leir and James F. Volin.

FARMINGTON, UTAH.—Articles of incorporation have been filed for the Davis County Independent Telephone Company with a capital stock of $40,000. The directors are: Dr. S. Gleason, Dr. Kesler, Rufus Adams, Bishop Wood, Dr. O. C. Dixon, Joseph Ford and J. S. White; treasurer, A. L. Clark; secretary-manager, N. B. Stadley.

WENATCHEE, WASH.—A stock company has been formed by the South Side ranchers to extend telephone service to that territory. The officers are: President, A. P. Kiser; vice-president, Eli Ball; secretary, Dave Packard; treasurer, John Doneen.

CONCORD, W. VA.—G. K. Kump and others have organized the Capon Telephone Company.

FAIRMONT, W. VA.—The National Telephone Company of Monongalia county has been incorporated with a capital stock of $50,000. The incorporators are: W. C. Handlan and S. W. Harper, Wheeling; C. E. Manley, J. Walter Barnes and E. F. Bartley, Fairmont.

CLYDE, WIS.—The Farmers' Telephone Company has been incorporated with a capital stock of $400 by George Gilbertson, James E. Moore and Frank Baker.

STURGEON BAY, WIS.—The Sawyer and Western Telephone Company has been incorporated; capital stock, $400; incorporators, Christopher Hanson, John A. May and George O. Whitford.

MOUNT FOREST, ONT., CAN.—The Mount Forest, Wellington and Grey Telephone Company has been incorporated; capital stock, $10,000. The incorporators are: R. O. Kilgour, J. J. Cook, Mount Forest; W. H. Wallace.

THORNDALE, ONT., CAN.—The East Middlesex Telephone Company has been incorporated; capital stock, $30,000. The directors are: R. L. Guest, R. T. Wright, F. W. Hughes.

RICHMOND, ONT., CAN.—The Malahide and Bayham Telephone Co-operative Association has been incorporated with a capital stock of $10,000.

MARION CENTER, PA.—The Marion Center Telephone Company has been organized with the following officers: President, H. P. Wetzell; vice-president, Dr. L. N. Park; secretary, Dr. A. H. Stewart; treasurer, William C. Griffith.

BELLO, TEX.—Articles of incorporation have been filed for the Bello Telephone Company, with a capital stock of $1,000. The incorporators are: Charles Wild, George C. Rehmet, George C. Milner, Westhoff, DeWitt county.

POUND, VA.—The Pound Telephone Company has been organized by Meredith Mullins, Robert Mullins and Gideon Webster, with a capital stock of $5,000.

PINEY, WYO.—The Piney Mutual Telephone Company has been organized here.

DUNDURN, SASK., CAN.—The Dundurn Rural Telephone Company has been organized by J. Burkitt and others.

SUNNY HILL, SASK., CAN.—The Sunny Hill Rural Telephone Company has been organized by E. J. Wright, Regina, and others.

NORTH YAKIMA, WASH.—The Wenas Telephone Company has been incorporated with a capital stock of $5,000. The trustees are Robert Cameron, George Longmire, A. J. Lotz, Harry E. Irving, Henry Lotz, S. D. Saunders and John Cleman.

SOUTH RYGATE, VT.—The Blue Mountain Telephone Company has been incorporated with a capital stock of $30,000. The incorporators are: M. F. Sargent, Albert Wright, A. T. Beaton, Carl Brown and others.

WEST TOWNSEND, VT.—The Globe Mountain Telephone Company has been incorporated by G. T. Gale, L. F. Jenson, and others of South Windham.

BERLIN, WIS.—The Berlin Telephone Company has been incorporated by C. S. Morris, L. C. Peck and Charles L. Bryden, with a capital stock of $6,000.

AVON, ILL.—The Banner Telephone Company has been incorporated by B. W. Rubart and A. E. Rubart.

MARISSA, ILL.—The Star Telephone Company has been incorporated by G. F. Paul, W. R. Lynn and R. J. Mearns, with a capital stock of $100,000.

DORCHESTER, ILL.—Articles of incorporation have been filed for the Dorchester Telephone Company; capital stock, $1,875; incorporators, D. M. Thompson, Henry H. Bauer and F. B. Luken.

COUNTY LINE, IND.—The Jennings and Jackson Telephone Company has been organized with the following officers: President, L. Richart; vice-president, William Kessler; secretary, Fred Niehaus; treasurer, P. Speckner.

HARMONY, IND.—The Harmony Telephone Company has been incorporated by Andrew J. Winn, W. H. Young and M. A. Tilly.

FRANCHISES ASKED AND GRANTED.

BETHALDO, ILL.—The Indian Creek Telephone Company has applied for a franchise in this village.

CROOKSTON, MINN.—The Tri-State Telephone and Telegraph Company has made application for a franchise to maintain a long distance line in this place.

THORNTON, KY.—The Thornton-Ola Telephone Company has secured a franchise to construct lines to Hillard and Lester. John S. Webb is manager.

WOOSTER, O.—The Central Union Telephone Company is seeking a franchise in this city.

HONOLULU, HAWAII.—The Hawaiian Telegraph and Telephone Company, which has acquired the franchise of the Standard Telephone Company, is planning an automatic telephone service.

WINCHESTER, KY.—The city council has granted a franchise to the East Tennessee Telephone Company.

MT. STERLING, KY.—A franchise has been granted to the Old Kentucky Telephone Company.

PLATTSMOUTH, NEB.—An ordinance has been passed granting a franchise to the Bell Telephone Company.

TEMPLE, TEX.—The Southwestern Telephone and Telegraph Company whose franchise has expired, has made application for a new franchise in this city; also in Bay City.

TACOMA, WASH.—John M. Bell, of the Postal Telegraph Company, has obtained a franchise for the construction of a new combination telephone and telegraph service between Tacoma and Longmire Springs, Pardise Valley and forest reserve points.

NEWTON, KAN.—The Home Telephone and Telegraph Company has been granted a franchise to establish a long distance toll station.

SPOKANE, WASH.—Nixon & Kimmel has asked for a franchise to construct an electric power and telephone line between Waverly and Fairfield.

WYANDOTTE, MICH.—The Independent Telephone Company has secured permission to install its service at Ford.

MCINTOSH, MINN.—The Garden Valley Telephone Company is seeking a franchise in this city.

MEDORA, N. D.—Franchises have been granted to the Northern Telephone Company and the Dakota Western Telephone Company to maintain telephone systems in this county.

MT. VERNON, WASH.—The city council is asked to grant a franchise to the Independent Telephone Company.

NORTH YAKIMA, WASH.—The Academy Telephone Company has applied for a franchise to construct a telephone line to Ahtanun Valley.

TULSA, OKLA.—The Citizens' Telephone Company, through J. L. Gillespie, has applied for a franchise to operate a telephone system in this city.

NORTH YAKIMA, WASH.—The Northeast Telephone Company, recently incorporated, will ask for a franchise to construct a line.

PALOUSE, WASH.—The Inland Empire Telephone and Telegraph Company has been granted a franchise to operate in this county.

WINLOCK, WASH.—Oscar Foote is seeking a telephone franchise in this city, also in Centralia.

FINANCIAL ITEMS.

SHERMAN, TEX.—The North Texas Telephone Company has increased its capital stock from $52,000 to $60,000.

ALTAMONT, ILL.—The Effingham County Telephone Company has increased its capital stock from $8,000 to $10,000.

PROPHETSTOWN, ILL.—The Prophetstown Mutual Telephone Company has increased its capital stock from $6,500 to $10,000.

KEOKUK, IA.—The Mississippi Valley Telephone Company has filed articles increasing its capital stock to $50,000.

MIDDLESBORO, KY.—The capital stock of the Middlesboro Home Telephone Company has been increased from $15,000 to $25,000.

SENATH, MO.—The Senath Telephone Company has increased its capital stock from $6,000 to $20,000.

ST. LOUIS, MO.—The Del Ria and Western Telephone Company has increased its capital stock from $20,000 to $60,000.

MONMOUTH, ILL.—The Monmouth Telephone Company has authorized a $125,000 bond issue to enlarge and improve its system in this city.

VANDALIA, ILL.—The Vandalia Telephone Company has increased its capital stock from $15,000 to $50,000.

FRANKFORT, KY.—The Grayson County Telephone Company has increased its capital stock from $2,500 to $5,000.

BRAYMER, MO.—The Braymer Roads Telephone Company will increase its capital stock to $5,000.

COLOMA, WIS.—The Coloma Telephone Company has increased its capital stock from $3,000 to $4,000.

WAUPACA, WIS.—The capital stock of the Rural Telephone Company has been increased from $1,000 to $3,000.

GROVER, COLO.—The Grover Telephone Company has decided to increase its capital stock to $10,000.

PETERSBURG, IND.—The Pike County Telephone Company has increased its capital stock from $40,000 to $50,000.

WOOSTER, O.—The Wayne County Telephone Company has decided to increase its capital stock from $10,000 to $100,000.

TOLEDO, O.—The United States Telephone Company has increased its capital stock from $1,000,000 to $1,500,000.

GLENWOOD, WIS.—The West Wisconsin Telephone Company has increased its capital stock from $12,000 to $20,000.

MISCELLANEOUS.

CARBONDALE, ILL.—The Ohio and Mississippi Valley Telephone Company has been purchased by A. R. Minton, John G. Hardy and W. C. Alexander of Murphysboro. The general offices will be removed to Murphysboro and many improvements are contemplated. A. R. Minton is president.

THIEF RIVER FALLS, MINN.—A recent meeting of the citizens of this place voted unanimously in favor of public ownership of the local telephone exchange.

ST. THOMAS, ONT., CAN.—A telephone system will be built by the hydro-electric commission along the public highways, paralleling the course of the power transmission line.

PERU, ILL.—Manager R. R. Hillard, of the Central Union, announces that his company will make extensive improvements at La Salle and Peru.

SPRING VALLEY, ILL.—The plants of the Bureau County Independent Telephone Company and the Spring Valley Telephone Company will be combined.

AURORA, ILL.—The Chicago Telephone Company will replace its overhead wires with underground conduits at an estimated cost of $20,000.

ANDERSON, IND.—The Central Union Telephone Company will enlarge and improve its system in this city, beginning about February 1.

WICHITA, KANS.—The Missouri and Kansas Bell Telephone Company will construct another exchange building in this city.

TOLEDO, IOWA.—The Commercial Telephone Company will make extensive improvements during the present year. An underground cable system is proposed.

BURTON, KANS.—The Independent Telephone Company will construct a new line north of here.

BANFIELD, MICH.—The Citizens' Telephone Company will install a new 100-line switchboard.

ST. CLAIR, MICH.—The St. Clair River Telephone Company will construct a line from this place to Recor's Point.

EASTON, MINN.—The Farmers' Telephone Company will make extensive improvements on its country lines.

ST. MICHAELS, MINN.—The Rural Telephone Company will build an exchange in this place.

MERIDIAN, MISS.—The Home Telephone Company plans to extend its line to Whitfield, Ala.

CHILLICOTHE, MO.—The People's Telephone Company will rebuild its system in this city. The improvements will cost about $4,000 and will include a new switchboard.

WEBB CITY, MO.—The Home Telephone Company will erect a new exchange building in this city.

DEER LODGE, MONT.—The Montana Independent Telephone Company will install a new exchange in this city.

HAVRE, MONT.—The Dakota Western Telephone Company, recently incorporated, will construct a line from Havre to Palermo, N. D.

JOHNSONVILLE, N. Y.—The Johnsonville Telephone Company will extend its lines to Boyntonville in the spring.

EMPORIA, VA.—The Greensville Water Power Company will take over the local system and rebuild it. Samuel Goodwyn is president of the company.

BRISTOL, WIS.—The Bristol Telephone Company will expend $5,000 in extensions and improvements.

COON VALLEY,, WIS.—The Coon Valley Farmers' Telephone Company is planning important extensions in the spring.

UTICA, WIS.—The Utica Telephone Company is planning improvements in the spring.

KILLAM, SASK., CAN.—J. A. Neely will construct a telephone line extending from this place.

SAN DIEGO, CAL.—The San Diego Home Telephone Company will build two new exchanges.

HOMERVILLE, GA.—H. J. Dame contemplates the construction of a local telephone system with long distance connections.

GREEN VALLEY, ILL.—The Citizens' Telephone Company will rebuild its system in this place.

PATON, IOWA.—The Hawkeye Telephone Company plans to construct a line from this place to Perry.

CORONA, N. D.—The Linden-Beech telephone lines will be rebuilt.

LEMMON, N. D.—The Montana and Dakota Telephone Company expects to construct a line across the Rock reservation in the spring.

TULSA, OKLA.—The new Citizens' Telephone Company is planning to erect a new exchange building in this city.

NORMAN, OKLA.—E. A. Smith and brother, who have recently acquired the Norman telephone exchange, expect to install a new common battery switchboard of 500 lines capacity.

WAYNESBURG, PA.—The Green County Telephone Company will expend $50,000 in improving its lines during the present year.

NORMA, S. D.—The Lewis Mutual Telephone Company is building a central station and extending its lines.

PRESHO, S. D.—The Pierre-Presho Telephone Company recently purchased the line from Presho to Sylvia and will extend it.

AMARILLO, TEX.—The Panhandle Telephone and Telegraph Company is installing a new exchange in this city.

ARANSAS PASS, TEX.—Hon. J. P. Gandy of Supply, Okla., will install a telephone service in this town and vicinity.

BROWNWOOD, TEX.—The West Texas Telephone Company plans an expenditure of $30,000 in the rebuilding of its system.

BIRMINGHAM, N. Y.—George B. Wright and Milan Bedrosia, representing Pennsylvania capitalists, will go to Turkey to investigate the field with a view to installing an extensive telephone system in the Turkish Empire.

INKSTER, N. D.—The Parker Telephone exchange has been purchased by a company of farmers for a consideration of $7,500. A company has been organized.

WAHPETON, N. D.—The five rural telephone lines extending out of Wahpeton have been purchased by A. H. Burnson, who will extend and improve them.

SINTON, TEX.—The local telephone system, formerly owned by J. J. Greathouse, Berclair, Tex., has been purchased by J. B. Dodson, who will make improvements.

NEWCASTLE, WYO.—The Inyan Kara Telephone Company has purchased the telephone line connecting Newcastle and Sundance.

PATON, IOWA.—The Mutual Telephone Company's office at this place was recently destroyed by fire.

TOYAH, TEX.—A. G. Vanhorn, owner of the local and long distance telephone system will entirely rebuild the local plant and will overhaul the long distance lines.

BELLINGHAM, WASH.—It is stated that the Home Telephone Company will expend $50,000 in extending its lines.

WAUSAU, WIS.—The Wausau Telephone Company will expend $10,000 to $12,000 during the year.

ALNWICK, ONT., CAN.—The Alnwick Rural Telephone Company has decided to proceed with construction work.

HARMON, ILL.—The Green River Telephone Company will extend its lines in the spring.

ELKHART, IND.—The Home Telephone Company will improve and extend its service during the year.

MT. CARMEL, KAN.—The Mt. Carmel Telephone Company plans extensive improvements. Geo. W. Hess, purchasing agent.

BURT LAKE, MICH.—The Buckeye Telephone Company contemplates the construction of additional lines.

DETROIT, MICH.—It is stated that the Home Telephone Company will expend $600,000 in extending its lines.

BIRD ISLAND, MINN.—The Bird Island Telephone Company will construct a line to Melville.

FELTON, MINN.—The Felton Rural Telephone Company will extend a line to Georgetown.

STORDEN, MINN.—The Mutual Telephone Company will install a new switchboard.

WEBB CITY, MO.—It is stated that the Home Telephone Company will at once begin the construction of its new building.

HANOVER, PA.—The New Baltimore Telephone Company, recently organized, will construct a line.

APPALACHIA, VA.—The Virginia-Tennessee Telephone Company will construct many new lines. R. J. Crabtree is manager.

BRISTOL, WIS.—The Bristol Telephone Company will make extensions in the spring.

HARTFORD, KANS.—The Hartford telephone exchange, formerly owned by John W. Fichter and George A. Fichter, has passed into the hands of E. E. Stout of La Harpe, Kans.

PROTECTION, KANS.—Henry De Spain has purchased a controlling interest in the Protection Telephone Company and now has full charge.

NORTH REDWOOD, MINN.—S. J. Sampson is promoting a rural telephone system.

FARNAM, NEB.—The Farnam Telephone Company has been purchased by A. La Bounty, president of the Moorefield Farm and Ranch Telephone Company.

SHERWOOD, S. D.—The local telephone system has been purchased by C. H. Budke, president of the Whitney Farmers' line.

FORT MEADE, FLA.—The Fort Meade telephone lines have been purchased by Sydney Rivers, who will extend them.

ATHENS, GA.—The exchange of the Southern Bell Telephone and Telegraph Company was recently damaged by fire to the extent of $8,000.

VERA, OKLA.—R. R. Mathews, of the Citizen State Bank, is interested in the promotion of a telephone line connecting Bartlesville and other towns.

WHEELING, W. VA.—The National Telephone Company has acquired the lines and other properties of the Enterprise Telephone Company of Belmont county.

HOLLYWOOD, ARK.—W. H. Tweedle, proprietor of the telephone system in Hollywood, will extend the system.

DEMOCRAT, KY.—The Upper Rockhouse and Beaver Creek Telephone Company will build a line from Deane to Baker. Dr. T. A. Cook, Democrat, is manager of the company.

BRANDON, IOWA.—The Farmers' Mutual Telephone Association will build a telephone line out from Brandon.

COLUMBUS, KANS.—The Cherokee County Mutual Telephone Company will install a 500-drop switchboard.

WHITESBURG, KY.—The Whitesburg Telephone Company is preparing to improve and extend its system. A new switchboard will be installed and a double line built to Big Stone Gap.

BADGER, MINN.—The Farmers' Telephone Company contemplates installing an exchange in this place.

ERHARD, MINN.—The Erhard telephone line will be extended, work to begin in the near future.

FELTON, MINN.—The Felton rural telephone line will be extended to Mary.

VERGAS, MINN.—The Frazee Telephone Company contemplates installing a new telephone system in this place.

HASTINGS, NEB.—The Hastings Telephone Company will extend its line to Prosser.

DUNKIRK, N. Y.—The police commissioners have voted to place telephone and alarm systems in the booths to be placed in all the wards.

CARNEGIE, OKLA.—Dr. G. O. Hall will install a 100-drop switchboard here.

BIG STONE, S. D.—The Grant County Telephone Company contemplates the construction of lines to Linden Beach and Vernon in the spring.

LEMMON, S. D.—The Montana and Dakota Telephone Company expects to build from Lemmon to Standing Rock reservation in the spring.

ANTIGO, WIS.—The Antigo Telephone Company will at once install a 600-line multiple switchboard, and many new lines will be added.

SURING, WIS.—The Carter and Wabeno Telephone Company is building a new line to Suring.

NEWCASTLE, WYO.—The Ranch and Home Telephone Company contemplates constructing a line between Sundance and Newcastle.

PRINCE RUPERT, B. C., CAN.—The Grand Trunk Pacific Railway will install an exchange at this place.

SACRAMENTO, CALIF.—The Glenn County Telephone Company will construct a new line.

GLASFORD, ILL.—The Glasford and Harkers Corners Telephone Company will rebuild its line.

MONMOUTH, ILL.—The Monmouth Telephone Company will extend its system in this city and construct a new exchange building.

GREENSBURG, IND.—The Decatur County Independent Telephone Company will install a new power equipment.

SOUTH BEND, IND.—The South Bend Home Telephone Company contemplates the expenditure of $30,000 in improvements during the present year.

WAVERLY, IOWA.—The Corn Belt Telephone Company will reconstruct its lines and install new exchange equipment.

DOWNING, MO.—J. H. St. Clair & Son of this city will construct a telephone plant at Grand Cane, La.

GRAND RAPIDS, MICH.—The Citizens' Telephone Company will probably build an east end station to take care of increased business.

PILOT GROVE, MO.—The Pilot Grove Independent Telephone Company will extend its line to Bunceton.

HOPKINS, MO.—The Mutual Telephone Company will install an additional switchboard.

OWENTON, KY.—The Owenton Telephone Company has been purchased by Judge J. M. Lassing, who will put the system in first-class condition.

ALBANY, N. Y.—The Bell Telephone Company of Pennsylvania has completed arrangements for taking over the shares of the local Hudson River Telephone Company, on the basis of three shares of Hudson River for two shares of the former company.

EDMONTON, ALB., CAN.—The demand for municipal telephone service has been so great that the supply of instruments was exhausted in a few weeks.

FORT WILLIAM, ONT.—The matter of raising $18,000 for the improvement of the municipal telephone system will be voted upon at the next municipal election.

SHIRLEY, IND.—H. N. Rhorer has purchased the Farmers' Mutual Telephone Company's plant and will install new equipment and extend the lines.

WOODBINE, IOWA.—The Woodbine Telephone Company will construct a concrete fireproof exchange building in the spring.

EFFINGHAM, KANS.—The Potter Telephone Exchange formerly owned by A. L. Edminster has been purchased by E. C. Yoakum.

EMPORIA, KANS.—W. W. Finney, manager of the Emporia Telephone Company, has petitioned for permission to raise rates, and will install a modern plant.

OSHKOSH, WIS.—The Oshkosh common council is considering the advisability of building a municipal telephone system. City Attorney W. C. Cowling has delivered an opinion to the council that under the public utilities law the city would be required to pay annual rentals amounting to about $600 for telephone service, and it is believed this amount could be placed in a fund to build and equip a municipal system, secure connections with the other lines and save hundreds of dollars annually. It is proposed to make the city electrician manager of the company.

MARQUETTE, MICH.—K. S. Baker, district manager of the Michigan State Telephone Company, announces that his company will construct a trunk line between Manistique and Trout Lake at a cost of $17,000, work to begin at once.

HELENA, MONT.—The Independent Telephone Company will erect a new exchange.

JACKSON, MISS.—The Cumberland Telephone and Telegraph Company will extend its long distance service from this city to Hattiesburg and other points.

OMAHA, NEB.—The Independent Telephone Company has available about $900,000 for new construction.

ORANGE, TEX.—The Southwestern Telegraph and Telephone Company contemplates making extensive improvements in its system here.

CHEHALIS, WASH.—The Spirit Lake Power and Mining Company will construct a telephone line to St. Helens.

RHINELANDER, WIS.—The Wisconsin Telephone Company has planned improvements which will involve an outlay of $1,000,000.

DAYTON, OHIO.—The Central Union Telephone Company will erect a new exchange in this city, with an ultimate capacity of 5,000.

SIMCOE, ONT., CAN.—The Bell Telephone Company will place its wires in this city underground.

DENVER, COLO.—The Colorado Telephone Company will place a large portion of its wires underground.

OTTAWA, ILL.—It is stated that the Central Union Telephone Company will place a number of its wires underground in La Salle and Peru during the year.

A Telephone Information Bureau

A novel feature in the way of telephone service has been inaugurated by the Illinois Carrier and Telephone Company, a recently organized concern operating at Arcola, Ill. A bureau of information has been established. Hereafter the telephone operator will become the office girl for many an Arcola business and professional man.

For example, a doctor goes to the country for a trip. before leaving, if he will call central and give the hour when he expects to return, this information will be written on a blackboard in the central office, so that when there is a call for him central can give this information at once. Deaths, time of funerals, the weather reports and all matters of local public interest will be bulletined on the board.

The management of the new concern has issued a notice to all its subscribers asking them to notify their office at once in case of deaths, accidents, births and other happenings and invites all who desire any such information to "call up central." In short the telephone exchange is to take the place of a daily newspaper office in that city.

L. G. Le Bourveau, formerly sales manager of the Central Telephone and Electric Company, has accepted a position as manager of the American Electric Telephone Company, Chicago. He succeeds Gustav F. C. Bauer.

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